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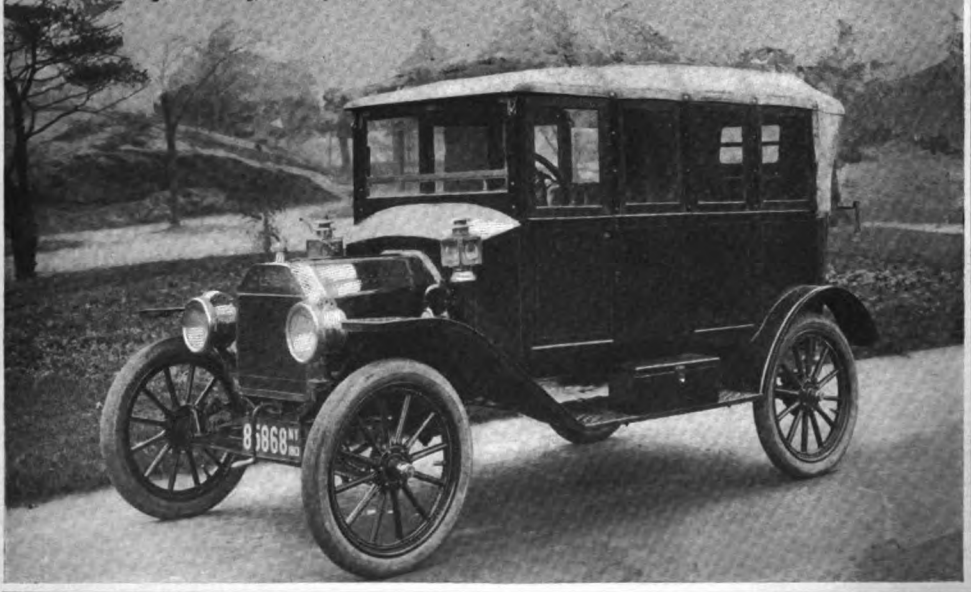

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A Classified Trade Directory of the Automobile and Commercial Vehicle Industries, containing the Names and Addresses of the American Manufacturers of Automobiles and Commercial Vehicles and of the Makers of Materials, Component Parts, Accessories, Machinery, Tools, Shop Equipment and Supplies. Contains also a Directory of National Trade Associations, Tables and Data and other pertinent information.

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Complete Vehicles

PART I

Classified Lists of the Manufacturers of Automobiles and Commercial Vehicles

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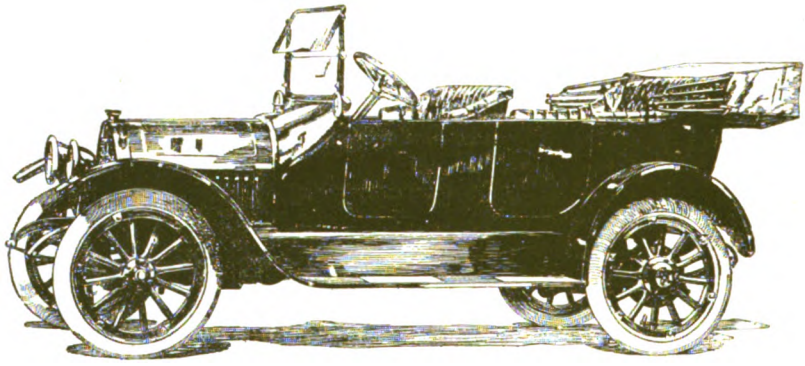
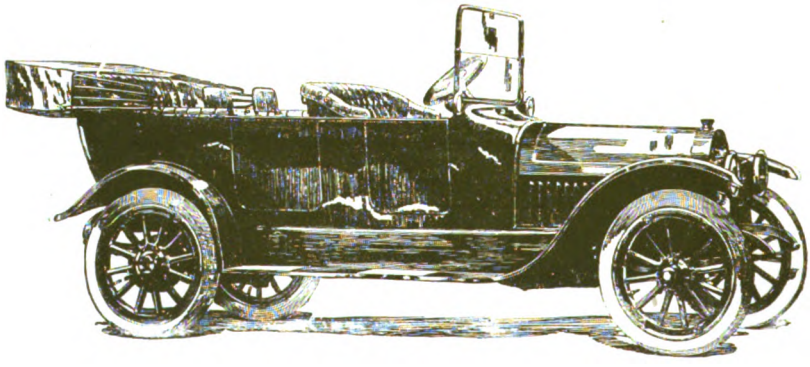
Studebaker

The Specifications Tell the Story



A Four-cylinder, Five-passenger Touring Car. 3½ x 5-inch Motor; Studebaker-Wagner Electric Starting and Lighting System.

FOUR Quick Detachable Demountable Rims; Extra Rim and Tire Holders; Robe and Foot Rails; 32 x 3½-inch Goodrich Tires; Complete Set of Tools; Electric Horn; Silk Mohair Top and Top Cover; Studebaker-Jiffy Side Curtains; Full-floating Rear Axle; Timken Bearings; Body, Studebaker Dark Blue; Hood, Fenders and Chassis, Jet Black; Clear and Rain Vision Ventilating Windshield Built on Body; Stewart-Warner Magnetic Speedometer; Full-elliptic Rear Springs. **$1050**



A Six-cylinder, Seven-passenger Touring Car, 3½ x 5-inch Motor; 121-inch Wheelbase; Studebaker-Wagner Electric Lighting System.

SIX Quick Detachable Demountable Rims; Extra Rim and Tire Holders; Robe and Foot Rails; 34 x 4-inch Goodrich Tires; Studebaker Crown Fenders; Electric Horn; Stewart-Warner Magnetic Speedometer; Full-floating Rear Axle; Timken Bearings; Clear and Rain Vision Ventilating Windshield Built on Body; Body, Studebaker Dark Blue; Hood, Fenders and Chassis, Jet Black; Silk Mohair Top and Top Cover; Studebaker-Jiffy Curtains; Hand-buffed Leather. **$1575**

The "Proof Book" is the most interesting book ever written on the manufacture of automobiles. Write for it.

STUDEBAKER **Detroit, Mich.**

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Part I

COMPLETE VEHICLES

PLEASURE VEHICLES

GASOLINE VEHICLES

ABBOTT-DETROIT—See Abbott Motor Co.

ABBOTT Motor Co., 650 Waterloo St., Detroit, Mich. "Abbott-Detroit." **(See page 48.)**

ADAMS Co., Dubuque, Iowa. "Adams-Farwell."

ADAMS-FARWELL—See Adams Co.

ALLEN Motor Co., Fostoria, O.

ALPENA Motor Car Co., Alpena, Mich.

AMALGAMATED Motors Corp., 400 S. Raymond Ave., Alhambra, Cal.

AMERICAN Motors Co., Indianapolis, Ind.

AMES Motor Car Co., Owensboro, Ky.

AMPLEX Motor Car Co., Byrkit Ave., Mishawaka, Ind.

APPERSON Bros., Automobile Co., Kokomo, Ind. "Jack Rabbit." **(See page 47.)**

AUBURN Automobile Co., Auburn, Ind. **(See page 49.)**

AUSTIN Automobile Co., 82-104 S. Division St., Grand Rapids, Mich.

BAKER-BELL Motor Co., 665-69 N. Broad St., Philadelphia, Pa.

BARTHOLOMEW Co. (Prospect Heights), Peoria, Ill. "Glide."

BELMONT Motor-Vehicle Co., Green St., Castleton, N. Y.

BRIGGS-DETROITER Co., 537 Holbrook Ave., Detroit, Mich. "Detroiter." **(See page 49.)**

BRIGHTWOOD Motor Mfg. Co., Birnie Ave. & Portland St., Springfield, Mass.

BROOKS Motor Car Co., Ellicott Sq. Bldg., Buffalo, N. Y.

BUCKEYE Mfg. Co., 154 Columbus Ave., Anderson, Ind. "Lambert."

BUICK Motor Co., Hamilton Ave., Flint, Mich.

BURG Carriage Co., L., Dallas City, Ill.

BURNS Bros., Havre de Grace, Md.

CADILLAC Motor Car Co., 1343 Cass Ave., Detroit, Mich.

CAMERON Mfg. Co., New Haven, Conn. **(See page 39.)**

CARROLL Motor Car Co., Main St., Strasburg, Pa.

CARTERCAR Co., Pontiac, Mich.

CASE, T. M., Co., J. I., State St., Racine, Wis.

CHADWICK Engineering Works, Keim St., Pottstown, Pa.

CHALMERS Motor Co., E. Jefferson Ave. & New Belt Line, Detroit, Mich.

CHANDLER Motor Car Co., Swetland Bldg., Cleveland, O.

CHEVROLET Motor Co., Flint, Mich.

CINCINNATI Motors Mfg. Co., 1743-45 Central Ave., Cincinnati, O.

CLEBURNE Motor Car Mfg. Co., Cleburne, Tex.

COLE California Motor Car Co., 900 High St., Oakland, Cal.

COLE Motor Car Co., Indianapolis, Ind. **(See page 49.)**

COLUMBUS Buggy Co., Dublin Ave., Columbus, O. "Firestone."

CONTINENTAL Motors Corp., Ellicott Sq. Bldg., Buffalo, N. Y.

CORREJA—See Vandewater & Co.

CRANE Motor Car Co., 94-104 W. Seventh St., Bayonne, N. J.

CRAWFORD Automobile Co., Surrey & Summit Aves., Hagerstown, Md.

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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

CRESCENT Motor Co., Cincinnati, O. "Northway." **(See page 51.)**

CROW Motor Car Co., Main & Simonton Sts., Elkhart, Ind.

CROWN Motor Car Co., 131 N. Third St., Louisville, Ky.

CROXTON Motor Car Co., Washington, Pa.

CUNNINGHAM, Son & Co., James, 18 Canal St., Rochester, N. Y.

CUTTING Motor Car Co., N. Mechanic St., Jackson, Mich.

DAVIS Motor Car Co., Geo. W., 11th & E. Sts., Richmond, Ind.

DAY Automobile Co., 25 Milwaukee Ave., E., Detroit, Mich.

DE SOTO Motor Car Co., Auburn, Ind.

DETROITER—See Briggs-Detroiter Co.

DODGE Motor Car Co., 3087 E. Grand Blvd., Detroit, Mich.

DORRIS Motor Car Co., 4100 Laclede Ave., St. Louis, Mo.

DUSSEAU Fore & Rear Drive Auto Co., 310 Erie St., Toledo, O.

ELKHART Carriage & Harness Mfg. Co., Elkhart, Ind. "Pratt."

EMPIRE Automobile Co., Indianapolis, Ind. **(See page 45.)**

ENGER Motor Car Co., 2100 Gest St., Cincinnati, O.

F-S Motors Co., 2500 First Ave., Milwaukee, Wis.

F-A-L Auto Co., 4052-58 Princeton Ave., Chicago, Ill.

FAWICK Motor Car Co., 811 W. 13th St., Sioux Falls, S. Dak.

F-I-A-T Co., Poughkeepsie, N. Y.

FIRESTONE—See Columbus Buggy Co.

FORD Motor Co., Woodward Ave., Detroit, Mich.

FOUR Wheel Drive Auto Co., Clintonville, Wis.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRANKLIN Mfg. Co., H. H., 101 W. Marcellus St., Syracuse, N. Y.

GARFORD Co., Elyria, O.

GAYLORD Motor Car Co., Gaylord, Mich.

GLIDE—See Bartholomew Co.

GRANT Motor Co., 1000 Woodward Ave., Detroit, Mich.

GREAT Southern Automobile Co., Third Ave. & Eighth St., Birmingham, Ala.

GREAT Western Automobile Co., Peru, Ind. **(See page 45.)**

HABERER & Co., Gest & Summer Sts., Cincinnati, O.

HAVERS Motor Car Co., 1701 Elmwood St., Port Huron, Mich.

HAYNES Automobile Co., 11 Main St., Kokomo, Ind. **(See page 37.)**

HEINE-VELOX Agency, 1466 Brush St., San Francisco, Cal.

HENDERSON Motor Car Co., Indianapolis, Ind.

HERRESHOFF Motor Co., Detroit, Mich. **(See page 45.)**

HOWARD—See Lexington-Howard Co.

HOWARD Motor Car Co., Connersville, Ind. **(See page 45.)**

HUDSON Motor Car Co., Jefferson Ave. & Connors Creek, Detroit, Mich.

HUPMOBILE—See Hupp Motor Car Co.

HUPP Motor Car Co., Mt. Elliott & Milwaukee Aves., Detroit, Mich. "Hupmobile."

IDEAL Motor Car Co., Indianapolis, Ind. "Stutz."

IMPERIAL Automobile Co., Jackson, Mich. **(See page 39.)**

INTER-STATE Automobile Co., Muncie, Ind.

INTERNATIONAL Harvester Corp., Akron, O.

JACK RABBIT—See Apperson Bros., Automobile Co.

JACKSON Automobile Co., E. Main & Horton Sts., Jackson, Mich.

JEFFERY Co., Thos. B., Kenosha, Wis. "Rambler."

KEARNS Motor Truck Co., Beavertown, Pa.

KEETON Motor Co., Lawton Ave. & M. C. R.R., Detroit, Mich.

KING Motor Car Co., 1300-04 Jefferson Ave., Detroit, Mich. **(See page 47.)**

KISSEL KAR—See Kissel Motor Car Co.

KISSEL Motor Car Co., 121 Kissel Ave., Hartford, Wis. "Kissel Kar."

KLINE Motor Car Corp., Richmond, Va.

KNOX Automobile Co., 53 Wilbraham Rd., Springfield, Mass.

K-R-I-T Motor Car Co., Mt. Elliott Ave. & E. Grand Blvd., Detroit, Mich.

LAMBERT—See Buckeye Mfg. Co.

LENOX Motor Car Co., Hyde Park, Mass.

LEXINGTON - HOWARD Co., Connersville, Ind. "Howard."

LOCOMOBILE Co. of America, 2 Main St., Bridgeport, Conn.

LOZIER Motor Co., Mack Ave., Detroit, Mich.

LUVERNE Automobile Co., Maple & McKenzie Sts., Luverne, Minn.

LYONS-ATLAS Co., Indianapolis, Ind. **(See page 35.)**

McFARLAN Motor Car Co., Connersville, Ind.

McINTYRE Co., W. H., Auburn, Ind.

MARATHON Motor Works, Clinton St. & 12th Ave., Nashville, Tenn.

MARION Motor Car Co., Oliver Ave. & Drover St., Indianapolis, Ind.

MARMON—See Nordyke & Marmon Co.

MASON Motor Co., 130 Maytag Station, Waterloo, Ia.

MAXWELL Motor Co., Detroit, Mich. **(See page 46.)**

MERCER Automobile Co., 500 Whitehead Rd., Trenton, N. J.

MERCURY Motor Co., 390 Webster Ave., Long Island City, N. Y.

METZ Co., Waltham, Mass. **(See page 46.)**

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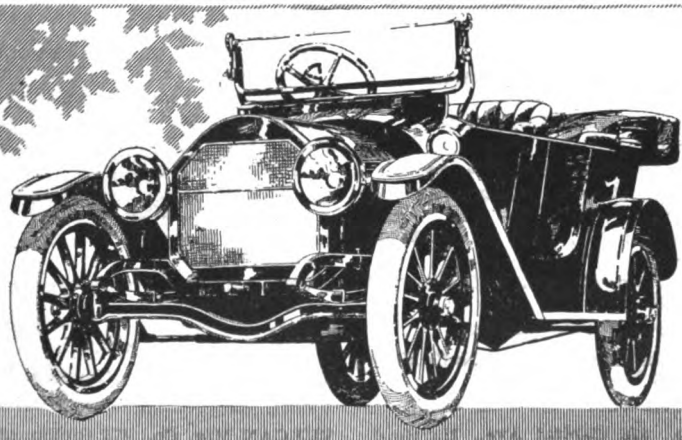

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PLEASURE VEHICLES

(Continued)

GASOLINE VEHICLES (Continued)

MIDLAND Motor Co., East Moline, Ill.

MILLER Car Co., Richmond & Custer Sts., Detroit, Mich.

MILLER Machine Co., 117 Front St., Defiance, O.

MITCHELL-LEWIS Motor Co., Racine, Wis.
(See page 39.)

MOLINE Automobile Co., 44 Keokuk St. (E. Moline), Moline, Ill.

MOON Motor Car Co., St. Louis, Mo.
(See page 48.)

MORSE Motor Car Co., South Easton, Mass.

MOTOR Car Mfg. Co., Indianapolis, Ind. "Pathfinder," "Parry."

MOYER, H. A., Park & Wolf Sts., Syracuse, N. Y.

NATIONAL Motor Vehicle Co., 1020 E. 22d St., Indianapolis, Ind.

NORDYKE & Marmon Co., 1101-31 W. Morris St., Indianapolis, Ind. "Marmon."

NORTHWAY—See Crescent Motor Car Co.

NORWALK Motor Car Co., Martinsburg, W. Va.
(See page 33.)

NYBERG Automobile Works, Anderson, Ind.

OAKLAND Motor Car Co., Pontiac, Mich.

OLDS Motor Works, Lansing, Mich. "Oldsmobile."

OLDSMOBILE—See Olds Motor Works.

OVERHOLT Co., S. Henderson & Fourth Sts., Galesburg, Ill.

OVERLAND—See Willys-Overland Co.

PACKARD Motor Car Co., N. Grand Blvd. & Belt Line, Detroit, Mich.

PAIGE-DETROIT Motor Car Co., Dept. C., Detroit, Mich.
(See page 46.)

PALMER Motor Car Co., Detroit, Mich. "Partin-Palmer."

PALMER & Singer Mfg. Co., Long Island City, N. Y.
(See page 47.)

PARRY—See Motor Car Mfg. Co.

PARTIN-PALMER—See Palmer Motor Car Co.

PATERSON Co., W. A., Flint, Mich.
(See page 46.)

PATHFINDER—See Motor Car Mfg. Co.

PEERLESS Motor Car Co., Quincy Ave. & S. E. 93d St., Cleveland, O.

PETREL Motor Car Co., First & Oklahoma Aves., Milwaukee, Wis.

PIERCE Arrow Motor Car Co., 1695 Elmwood Ave., Buffalo, N. Y.

PILOT Motor Car Co., Richmond, Ind.

PITTSBURG Motor Car Co., First Nat'l Bank Bldg., Pittsburg, Pa.

POPE-HARTFORD—See Pope Mfg. Co.

POPE Mfg. Co., 436 Capital Ave., Hartford, Conn. "Pope-Hartford."

PRATT—See Elkhart Carriage & Harness Mfg. Co.

PREMIER Motor Mfg. Co., Shelby & Georgia Sts., Indianapolis, Ind.

PULLMAN Motor Car Co., York, Pa.
(See page 37.)

R-C-H Corp., 138 Lycaste St., Detroit, Mich.

RAMBLER—See Jeffery Co.

RAYFIELD Motor Co., Chrisman, Ill.

READ Motor Car Co., 541 Woodward Ave., Detroit, Mich.

REGAL Motor Car Co., 201 Piquette Ave., Detroit, Mich.

REO Motor Car Co., Lansing, Mich.

REPUBLIC Motor Car Co., Hamilton, O.

ROGERS Motor Car Co., 309 S. 17th St., Omaha, Neb.

ROYAL Tourist Car Co., L. S. & M. S. Ry. & E. 72d St., Cleveland, O.

S. G. V. Co., N. Eighth St., Reading, Pa.

S. & M. Motor Co., 1900 Mt. Elliott Ave., Detroit, Mich.
(See page 37.)

ST. LOUIS Motor Truck Co., 4274-76 Easton Ave., St. Louis, Mo.

SALTER Motor Co., Wm. A., 1516-18 Oakland Ave., Kansas City, Mo.

SCHACHT Motor Car Co., 2780 Spring Grove Ave., Cincinnati, O.

SEBRING Motor Car Co., Sebring, O.

SELDEN Motor Vehicle Co., University Ave. & Probert St., Rochester, N. Y.

SIMPLEX Automobile Co., New Brunswick, N. J.

SOUTHERN Auto & Equipment Co., 92-94 S. Forsythe St., Atlanta, Ga.

SPAULDING Mfg. Co., Grinnell, Ia.

SPEEDWELL Motor Car Co. (Edgemont), Dayton, O.

SPOERER'S Sons Co., Carl, 901-09 S. Carey St., Baltimore, Md.

STAFFORD Motor Car Co., Independence Rd. & Blue River, Kansas City, Mo.

STAVER Carriage Co., 76th & Wallace Sts., Chicago, Ill.
(See page 48.)

STEARNS Co., F. B., Cleveland, O.

STEVENS-DURYEA Co., Chicopee Falls, Mass.
(See page 47.)

STUDEBAKER, Detroit, Mich.
(See page 28.)

STUTZ—See Ideal Motor Car Co.

TONE Car Corp., Indianapolis, Ind.

TOURAINE Co., Broad & Huntington Sts., Philadelphia, Pa.

TRAVELER Motor Car Co., 1148 Grand River Ave., Detroit, Mich.

TRIUMPH Motor Car Co., 3308 Sheffield Ave., Chicago, Ill.

UNITED States Carriage Co., 309-19 S. Fourth St., Columbus, O.

VANDEWATER & Co., 71 Prince St., Elizabeth, N. J. "Correja."

VAUGHAN Car Co., Kingston, N. Y.

VELIE Motor Vehicle Co., Moline, Ill.

VULCAN Mfg. Co., 475 Richmond St., Painesville, O.

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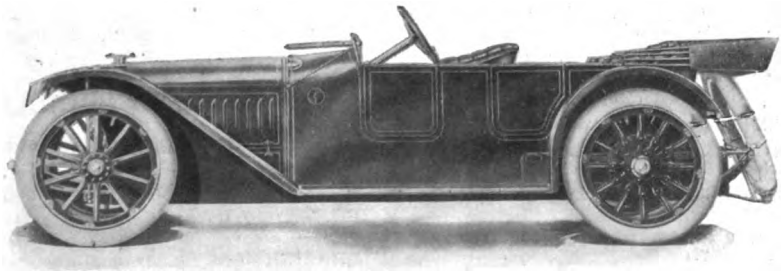

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Model D—Two and Four Passenger..... 2685
Six Passenger furnished on special order

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PLEASURE VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

W. F. S. Motor Car Co., 4224 Ludlow St., Philadelphia, Pa.

WAHL Motor Co., 3087 E. Grand Blvd., Detroit, Mich.

WASHINGTON Motor Car Co., Hyattsville, Md.

WAYNE Works, 16th & F. Sts., Richmond, Ind.

WESTCOTT Motor Car Co., 12th & N. E. Sts., Richmond, Ind.

WHITE Co., Cleveland, O. (See Back Cover.)

WICHITA Falls Motor Co., Wichita Falls, Tex.

WILLYS-OVERLAND Co., Dept. 142, Toledo, O. "Overland." (See page 31.)

WINTON Motor Carriage Co., Berea Rd., Cleveland, O.

ZIMMERMAN Mfg. Co., 411 Indiana Ave., Auburn, Ind.

ELECTRIC VEHICLES

ANDERSON Electric Car Co., Riopelle St. & Clay Ave., Detroit, Mich. "Detroit."

ARGO Electric Vehicle Co., Saginaw, Mich.

BAILEY & Co., S. R., 395 Boylston St., Boston, Mass.

BAKER Motor Vehicle Co., Edgewater Park & L. S. & M. S. Ry., Cleveland, O.

BORLAND-GRANNIS Co., 310 E. Huron St., Chicago, Ill.

BROC Electric Vehicle Co., Payne & 40th Sts., Cleveland, O. (See page 43.)

BRUNN'S Carriage Mfg. Co., 1140-48 Main St., Buffalo, N. Y.

BUFFALO Electric Vehicle Co., 1227 Main St., Buffalo, N. Y.

CENTURY Electric Car Co., 1199 Woodward Ave., Detroit, Mich.

CHICAGO Electric Motor Car Co., 3612-18 S. Morgan St., Chicago, Ill.

COLUMBUS Buggy Co., Dublin Ave., Columbus, O. "Firestone."

DAYTON Electric Car Co., Fourth & St. Clair Sts., Dayton, O.

DETROIT—See Anderson Electric Car Co.

FIRESTONE—See Columbus Buggy Co.

FRITCHLE Automobile & Battery Co., 1510-30 Clarkson St., Denver, Colo.

GRINNELL Electric Car Co., 14-16 Atwater St., E., Detroit, Mich.

KIMBALL & Co., C. P., Chicago, Ill. (See page 97.)

MAC INNES Bros., 118-22 22d St., Toledo, O.

OHIO Electric Car Co., 1501-07 W. Bancroft St., Toledo, O.

R-C-H Corp., 138 Lycaste St., Detroit, Mich.

RAUCH & Lang Carriage Co., 2180 W. 25th St., Cleveland, O. (See page 48.)

STANDARD Electric Car Co., Park Ave., Jackson, Mich.

WAVERLEY Co., 139 S. East St., Indianapolis, Ind.

WOODS Motor Vehicle Co., Cottage Grove, Calumet & 25th St., Chicago, Ill.

STEAM VEHICLES

ROSS, Louis S., 38 Crafts St., Newtonville, Mass.

STANLEY Motor Carriage Co., Hunt St., Newton, Mass.

CYCLECARS

AMERICAN Cyclecar Co., Connecticut & Florence Aves., Bridgeport, Conn.

AMERICAN Voiturette Co., Lawton & Buchanan Aves., Detroit, Mich. "Carnation."

AUTOMOBILE Cycle Car Co., Wayne Co. Bank Bldg., Detroit, Mich.

CARNATION—See American Voiturette Co.

DETROIT Cycle Car Co., Free Press Bldg., Detroit, Mich.

DOWNING-DETROIT Cycle Car Co., Detroit, Mich.

ECONOMYCAR Co., 2111 Broadway, Indianapolis, Ind.

FALCON Cyclecar Co., 10308 Euclid Ave., Cleveland, O.

FENTON Cyclecar Co., Fenton, Mich.

IMP—See McIntyre Co.

LITTLE PRINCESS—See Princess Cyclecar Co.

LOS ANGELES Cycle Car Co., 612 S. Olive St., Los Angeles, Cal.

MC INTYRE Co., W. H., Auburn, Ind. "Imp."

PRINCESS Cyclecar Co., 790 Woodward Ave., Detroit, Mich. "Little Princess."

RAYFIELD Motor Co., Chrisman, Ill.

ROCKET—See Scripps-Booth Cyclecar Co.

SCRIPPS-BOOTH Cyclecar Co., Lincoln Ave. & Mich. Central R. R., Detroit, Mich. "Rocket."

STICKNEY Co., Charles A., St. Paul, Minn.

WOODS Mobilette Co., 1509 Michigan Blvd., Chicago, Ill. (See page 43.)

ZIP Cyclecar Co., Davenport, Iowa.

IMPORTED VEHICLES

ADAMS-LANCIA Co., 235 W. 58th St., New York, N. Y. "Lancia."

AUSTRIAN-DAIMLER—See Healey & Co.

BENZ Auto Import Co., 250 W. 54th St., New York, N. Y. "Gaggenau."

BRASIER—See Flandrau Motor Car Co.

BREWSTER & Co., Queensboro Bridge Plaza, Long Island City, N. Y. "Delauney-Belleville."

CAVALIERI, R. A., 103 W. 57th St., New York, N. Y. "Napier."

CLEMENT-BAYARD—See LaCroix Auto Co.

CRYDER & Co., 583 Park Ave., New York, N. Y. "Leon Bollee."

Complete Index to Classification appears on Pages 8 to 22.

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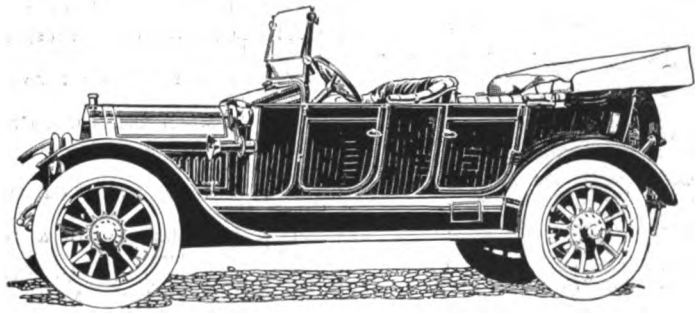
Lyons-Knight

"The Car of Silence"



Just Three Reasons

Here are three out of hundreds of reasons that are influencing dealers in securing the Lyons-Knight agency:

(1) The makers have one of the world's greatest automobile plants—are backed by unlimited capital and are leaving nothing undone to make this proposition a success.

(2) The car itself, with finest Knight motor, worm drive and many other distinctive features, offers the greatest of values at any price. The line also includes a smaller four-cylinder Knight car, a six-cylinder Knight car and commercial cars, meeting every class of trade.

(3) The dealer's proposition is by far the most liberal offered by any reliable manufacturer. It includes substantial profits for every Lyons-Knight dealer.

Already many of the most important cities are taken by prominent and well-established dealers. They are without exception men of years of experience, who have quickly realized the opportunities of this great proposition.

Your territory will be closed just as soon as we find the right dealer. There are going to be good profits for the Lyons-Knight dealer right in your town. If you will write us for particulars we will gladly show you hundreds of other reasons why this is true.

Lyons-Knight Features

50 horse power silent Knight engine—the finest power plant ever made.

Silent, smooth, efficient worm drive.

130 inch wheel base with 37 x 5 inch tires, non-skid in rear, on quick, detachable, demountable rims.

Full floating rear axle, strong, flexible springs, ample brakes.

Left hand drive, center control.

Extra complete equipment, with electric starting and lighting system, patent one-man top with drop side curtains and every other refinement.

Price—Five Passenger Touring Car—$2900; Seven Passenger Touring Car—$2980.

Value—unequalled.

Ask for our Advance Catalog and "Proofs of the Lyons-Knight" today.

Lyons-Atlas Company

Indianapolis, Indiana

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IMPORTED VEHICLES (Continued)

PLEASURE VEHICLES (Continued)

DAIMLER Mfg. Co., 1784 Broadway, New York, N. Y.

DARRACQ—See Ducasse & Co., Henry.

DE DION-BOUTON Selling Branch, 1649 Broadway, New York, N. Y.

DELAUNEY-BELLEVILLE—See Brewster & Co.

DEMAREST & Co., A. T., Broadway & 57th St., New York, N. Y. "Itala."

DUCASSE & Co., Henry, 733 Seventh Ave., New York, N. Y. "Darracq."

FIAT Automobile Co., 1776 Broadway, New York, N. Y.

FLANDRAU Motor Car Co., 406-12 Broome St., New York, N. Y. "Brasier."

GAGGENAU—See Benz Auto Import Co.

HEALEY & Co., Broadway & 51st St., New York, N. Y. "Austrian-Daimler," "Panhard."

ISOTTA Fraschini Motors Co., 1920 Broadway, New York, N. Y.

ITALA—See Demarest & Co., A. T.

LA CROIX Auto Co., Paul, 1770 Broadway, New York, N. Y. "Clement-Bayard," "Zedel."

LANCIA—See Adams-Lancia Co.

LEON BOLLEE—See Cryder & Co.

MERCEDES Repair Co., 159 E. 54th St., New York, N. Y.

METALLURGIQUE Motor Co., 1876 Broadway, New York, N. Y.

MOTO-BLOC Import Co., 2008 Broadway, New York, N. Y.

NAPIER—See Cavalieri, R. A.

PANHARD—See Healey & Co.

PEUGEOT Auto Import Co., 59th St. & Fifth Ave., New York, N. Y.

RENAULT Selling Branch, 1770 Broadway, New York, N. Y.

S. P. O. Automobile Co., 244 W. 49th St., New York, N. Y.

ZEDEL—See La Croix Auto Co.

ZUST Motor Co., 235-37 W. 50th St., New York, N. Y.

COMMERCIAL VEHICLES

GASOLINE VEHICLES

A & R—See Abendroth & Root Mfg. Co.

ABENDROTH & Root Mfg. Co., 48A Church St., New York, N. Y. "A. & R."

ADAMS Bros. Co., Findlay, O.

ALMA Motor Truck Co., Alma, Mich. "Republic."

ARMLEDER Co., O., Cincinnati, O. (See page 50.)

ATTERBURY Motor Car Co., Hertel & Elmwood Aves., Buffalo, N. Y.

AUBURN Motor Chassis Co., Auburn, Ind.

AUGLAIZE Motor Car Co., New Bremen, O.

AUTOCAR Co., Ardmore, Pa.

AVAILABLE Truck Co., 1539 N. 47th Ave., Chicago, Ill.

AVERY Co., Peoria, Ill.

BAKER-BELL Motor Co., 665-69 N. Broad St., Philadelphia, Pa.

BARKER, C. L., Norwalk, Conn.

BARTHOLOMEW Co. (Prospect Heights), Peoria, Ill.

BECK & Son, 901-03 First Ave. W., Cedar Rapids, Ia.

BESSEMER Motor Truck Co., Grove City, Pa.

BLAIR Mfg. Co., Newark, O. (See page 50.)

BOWLING Green Motor Car Co., Bowling Green, O.

BOYD & Bro., James, 25th & Wharton Sts., Philadelphia, Pa.

BROOKS-LATTA Automobile Mfg. Co., 4255 Fairfax Ave., St. Louis, Mo.

BROWN Commercial Car Co., Peru, Ind.

BUCKEYE Mfg. Co., 154 Columbus Ave., Anderson, Ind.

BUCKLEN, Jr., Motor Truck Co., H. E., Elkhart, Ind.

BUICK Motor Co., Hamilton Ave., Flint, Mich.

BUFFALO Auto-Truck & Motor Co., Sussex St., Buffalo, N. Y.

CARROLL Motor Car Co., Main St., Strasburg, Pa.

CASS Motor Truck Co., Lapeer Ave., Port Huron, Mich.

CHASE Motor Truck Co., Syracuse, N. Y. (See page 43.)

CHICAGO Pneumatic Tool Co., Fisher Bldg., Chicago, Ill. "Little Giant."

CINCINNATI Motors Mfg. Co., 1743-45 Central Ave., Cincinnati, O.

CLARK, Edward S., 242 Freeport St. (Dorchester), Boston, Mass.

CLARK Delivery Car Co., 76th St. & Greenwood Ave. (Grand Crossing), Chicago, Ill.

CLEBURNE Motor Car Mfg. Co., Cleburne, Tex.

CLEVELAND-GALION Motor Truck Co., Primrose St., Galion, O.

COLEMAN Motor Truck Co., Morgan & Main Sts., Ilion, N. Y.

COMMER—See Vaughan Car Co.

COMMERCE Motor Car Co., Solvay & Mackie Aves., Detroit, Mich.

CONTINENTAL Truck Mfg. Co., 1702 16th St., Superior, Wis.

CORBITT Automobile Co., Henderson, N. C.

COUPLE-GEAR Freight-Wheel Co., 1450 Buchanan St., Grand Rapids, Mich.

CRARY Motor Car Co., 650 Woodward Ave., Detroit, Mich.

CRAWFORD Automobile Co., Surrey & Summit Aves., Hagerstown, Md.

CRESCENT Motor Co., Cincinnati, O. "Northway." (See page 51.)

CRESCENT Motor Truck Co., Middletown, O.

Complete Index to Classification appears on Pages 8 to 22.

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PULLMAN "LITTLE SIX"

The only genuine streamline motor car built in this country.

This epoch-making automobile with

Vulcan Electric Gear Shift
Westinghouse Electric Starting and Lighting
Bosch Magneto, and Wire Wheels

Priced at only $2400.
Without Electric Gear Shift—$2250.
"Fours" and "Sixes"—$1775 to $2850.
Write or wire.

PULLMAN MOTOR CAR COMPANY

York **Pa.**

A NEW SIX FOR A NEW MARKET

Answers the demand for something that looks better—is better in action—and at a better price.

Every feature is standard and the highest of its class in quality and reputation.

Every dealer in quality cars should get the S. & M. proposition at once.

Five-passenger touring car, $2,485.

S. & M. MOTOR COMPANY, Inc.
1900 Mt. Elliott Ave., Detroit, Mich.

HAYNES

America's First Car

Literally sells itself

Usual conditions are being reversed this year among Haynes dealers. Prospective auto buyers are hunting up Haynes dealers to see the new models of America's most famous car. The

Vulcan Electric Gear Shift is standard equipment

Wonderful is the only name strong enough to fit the device by which the gear lever is entirely done away with—replaced by a simple dial of push buttons on the steering wheel. Instead of a hard pull, a mere pressure of the finger results in an instantaneous gear shift. No chance to strip a gear.

Three great models

Model 27, illustrated, 6 cyl., 65 Dynamometer H. P., 136 in. wheelbase, 6 or 7 passenger, **$2785;** limousine, **$3850.**

Model 28, 4 cyl., 48 Dynamometer H. P., 118 in. wheelbase, 2 passenger roadster, 4 or 5 pass. touring, **$1985;** coupe, **$2700.**

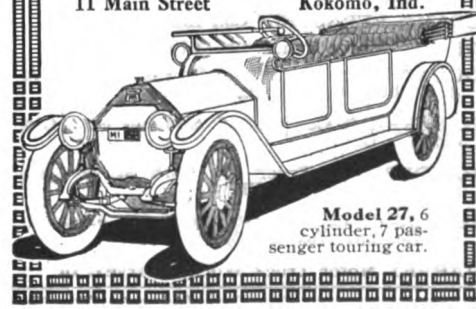
Model 26, 6 cyl., 65 Dynamometer H. P., 130 in. wheelbase, 2 passenger roadster, 4 or 5 pass. touring, **$2700;** coupe, **$3200.**

Hand lever optional at $200 reduction.

Write for our proposition

The opportunity may yet be open to you to secure the sale of Haynes cars in your neighborhood. Investigate at once.

The Haynes Automobile Co.
11 Main Street **Kokomo, Ind.**



Model 27, 6 cylinder, 7 passenger touring car.

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COMMERCIAL VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

CROW Motor Car Co., Main & Simonton Sts., Elkhart, Ind.

CROWN Commercial Car Co., North Milwaukee, Wis.
(See page 307.)

CROXTON Motor Car Co., Washington, Pa.

CURTIS—See Pittsburg Machine Tool Co.

DAIN Mfg. Co. of Iowa, Ottumwa, Ia.

DART Motor Mfg. Co., Waterloo, Ia.

DAYTON Auto Truck Co., 725 E. First St., Dayton, O.

DETROIT-WYANDOTTE Motor Co., Wyandotte, Mich. "Horner."

DORRIS Motor Car Co., 4100 Laclede Ave., St. Louis, Mo.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. "Vulcan."
(See page 607.)

DURANT-DORT Carriage Co. (Flint Motor Wagon Dept.), Flint, Mich.
(See page 49.)

DUSSEAU Fore & Rear Drive Auto Co., 310 Erie St., Toledo, O.

EASTERN Power Truck Co., 341-49 Eddy St., Providence, R. I.

ELK Motor Truck Co., Charleston, W. Va.

F-A-L Auto Co., 4052-58 Princeton Ave., Chicago, Ill.

F-S Motors Co., 2500 First Ave., Milwaukee, Wis.

FARGO Motor Car Co., 1308-10 W. 22d St., Chicago, Ill.

FAWICK Motor Car Co., 311 W. 13th St., Sioux Falls, S. Dak.

FEDERAL Motor Truck Co., Detroit, Mich.

FORD Motor Co., Woodward Ave., Detroit, Mich.

FOUR Wheel Drive Auto Co., Clintonville, Wis.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRONT Drive Motor Co., 16th St. & Willow Ave., Hoboken, N. J.

GABRIEL Auto Co., 315 Prospect Ave. W., Cleveland, O.

GARFORD Co., Elyria, O.

GAYLORD Motor Car Co., Gaylord, Mich.

GENERAL Motors Truck Co., Pontiac, Mich.

GENEVA Automobile Co., 145 Castle St., Geneva, N. Y.

GRAMM-BERNSTEIN Co., Lima, O.

GRAMM Motor Truck Co., Lima, O.

GREAT Southern Automobile Co., Third Ave & Eighth St., Birmingham, Ala.

HABERER & Co., Gest & Summer Sts., Cincinnati, O.

HARDER Auto-Truck Co., 40th St. & Calumet Ave., Chicago, Ill.

HARRISON Co., Robert, 324-38 W. First St., (S. Boston), Boston, Mass.

HARVEY Motor Truck Works, Harvey, Ill.

HARWOOD-BARLEY Mfg. Co., Marion, Ind.

HERCULES Motor Truck Co., First & L Sts. (S. Boston), Boston, Mass.

HEWITT—See International Motor Co.

HORNER—See Detroit-Wyandotte Motor Co.

ICE Mfg. Co., 1170 Broadway, New York, N. Y.

IDEAL Auto Co., 616-50 High St., Fort Wayne, Ind.

INTERNATIONAL Harvester Corp., Akron, O.

INTERNATIONAL Motor Co., Broadway & 57th St., New York, N. Y. "Mack," "Saurer," "Hewitt."

KEARNS Motor Truck Co., Beavertown, Pa.

KELLY-SPRINGFIELD Motor Truck Co., Burt & Sheridan Sts., Springfield, O.

KING Mfg. Co., A. R., Kingston, N. Y.

KISSEL Motor Car Co., 121 Kissel Ave., Hartford, Wis.

KLINE Motor Car Corp., Richmond, Va.

KNICKERBOCKER Motor Truck Mfg. Co., River Ave. & 151st St., New York, N. Y.

KNOX Automobile Co., 53 Wilbraham Rd., Springfield, Mass.

KOPP Motor Truck Co., 49 E. Utica St., Buffalo, N. Y.

KREBS Commercial Car Co., Clyde, O.

KRICKWELL Motor Truck Co., 1373 E. 55th St., Chicago, Ill.

LANDSHAFT & Son, Wm., 2336-38 Milwaukee Ave., Chicago, Ill.

LANGE Motor Truck Co., 145 S. St. Clair St., Pittsburg, Pa.

LAUTH-JUERGENS Motor Car Co., Fremont, O.

LINCOLN Motor Car Works, 319 N. Albany Ave., Chicago, Ill.

LIPPARD-STEWART Motor Car Co., 1738 Elmwood Ave., Buffalo, N. Y.

LITTLE GIANT—See Chicago Pneumatic Tool Co.

LOCOMOBILE Co. of America, 2 Main St., Bridgeport, Conn.

McINTYRE Co., W. H., Auburn, Ind.

MACK—See International Motor Co.

MAIS Motor Truck Co., Indianapolis, Ind.

MARATHON Motor Works, Clinton St. & 12th Ave., Nashville, Tenn.

MARTIN Carriage Works, York, Pa.

MASON Motor Co., 130 Maytag Station, Waterloo, Ia.

MAXIM Tricar Mfg. Co., 1777 Broadway, New York, N. Y.

MAXWELL Motor Co., Detroit, Mich.
(See page 46.)

MERCHANTS Automobile Co., 2014 Sheffield Ave., Chicago, Ill.

MERCURY Mfg. Co., 4110 S. Halsted St., Chicago, Ill.

METROPOLITAN Automobile Works, 2971 State St., Chicago, Ill.

MOGUL Motor Truck Co., 6100 Maple Ave., St. Louis, Mo.

MONITOR Automobile Works, Janesville, Wis.

MORA Power Wagon Co., 5320-28 St. Clair Ave., Cleveland, O.

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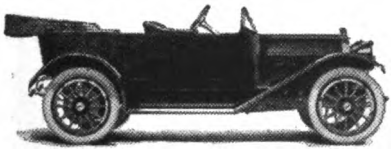
THE IMPERIAL "44"

Costs Less **Gives More**



SPECIFICATIONS

Long Stroke Motor 4¾ x 5½
Unit Power Plant
122 inch Wheel Base 36 x 4 Tires

Center Control
Electric Started
Electric Lighted
Fully Equipped

FOUR OTHER MODELS

Write for Catalog and Comparative Chart, and Honest Comparison.

IMPERIAL AUTOMOBILE CO.
JACKSON, MICHIGAN

Individuality

CAMERON "4"

Electrically Lighted
Electrically Started

$1,200

THE FOUR SPEED DIRECT DRIVE TRANSMISSION—a patented feature and exclusive with us, permits direct drive on every speed and gives 35 per cent more power than any other type.

THE LONG STROKE EN BLOC MOTOR with valves in centre of combustion chamber makes for higher efficiency.

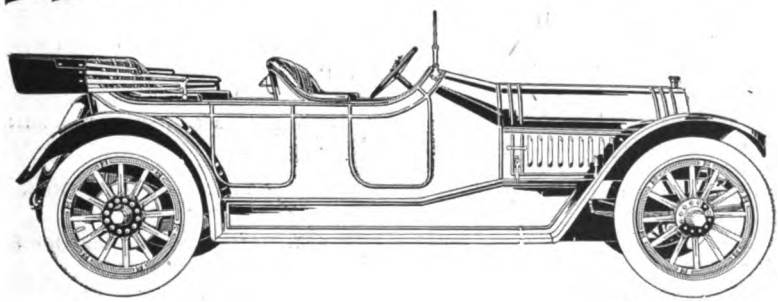
THE VALVE MECHANISM ENCLOSED ensures quietness and freedom from wear or trouble.

These and many other distinctive features all stamp the **CAMERON "4"** as the car of **"INDIVIDUALITY."**

May we not send our booklet describing in detail the construction of the "sturdiest and most economical car built?"

THE CAMERON MFG. CO.
NEW HAVEN, CONN.

Mitchell CARS



It's a great line for you—the Mitchell Line.

Made by a firm which has been noted for its progressive and honest business methods during its Seventy-nine years of successful experience in manufacturing Vehicles, and Twelve years of successful experience in manufacturing Motor Cars.

MITCHELL-LEWIS MOTOR CO., Racine, Wis., U. S. A.

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COMMERCIAL VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

MORELAND Motor Truck Co., 1701 N. Main St., Los Angeles, Cal.

MORSE Motor Car Co., South Easton, Mass.

MOTOKART—See Tarrytown Motor Car Co.

MOTOR Vehicle & Marine Const. Co., Sewaren, N. J.

MUEHLHAUSER Machine Co., Hamilton Ave. & Marquette St., Cleveland, O.

NATIONAL Motor Truck Co., Bay City, Mich.

NELSON & Le Moon, 815 N. Kedzie Ave., Chicago, Ill.

NEW York Motor Works Co., Avondale, N. J.

NORTHWAY—See Crescent Motor Car Co.

NYBERG Automobile Works, Anderson, Ind.

OHIO Mfg. Co., Upper Sandusky, O.

OLIVER Motor Truck Co., 460 Lawton Ave., Detroit, Mich.

OVERLAND—See Willys-Overland Co.

OWOSSO Motor Co., Owosso, Mich.

PACKARD Motor Car Co., N. Grand Blvd & Belt Line, Detroit, Mich.

PACKERS Motor Truck Co., Wheeling, W. Va.

PALMER-MOORE Co., 110 N. Geddes St., Syracuse, N. Y.

PARSONS Co., G. W., Newton, Ia.

PEERLESS Motor Car Co., Quincy Ave. & S. E. 93d St., Cleveland, O.

PETREL Motor Car Co., First & Oklahoma Aves., Milwaukee, Wis.

PHOENIX Auto Works, Phoenixville, Pa.

PIERCE Arrow Motor Car Co., 1695 Elmwood Ave., Buffalo, N. Y.

PITTSBURG Machine Tool Co., Braddock, Pa. "Curtis."

PLYMOUTH Motor Truck Co., Plymouth, O.

POPE Mfg. Co., 436 Capital Ave., Hartford, Conn.

POYER & Co., D. F., Broadway & Saxton Ave., Menominee, Mich.

PRATT, Carter, Sigsbee & Co., 772 Howard St., Detroit, Mich.

READ Motor Car Co., 541 Woodward Ave., Detroit, Mich.

REO Motor Car Co., Lansing, Mich.

REPUBLIC—See Alma Motor Truck Co.

REXFORD-RILEY & Morris, Elmira, N. Y.

ROBINSON Motor Truck Co., Second Ave. & Seventh St., Minneapolis, Minn.

ROGERS Motor Car Co., 308 S. 17th St., Omaha, Neb.

ROWE Motor Mfg. Co., Downingtown, Pa.

ST. LOUIS Motor Truck Co., 4274-76 Easton Ave., St. Louis, Mo.

SALENTINE-LIBBY & Co., Milwaukee, Wis.

SANDOW Truck Co., 3751-55 Wentworth Ave., Chicago, Ill.

SANFORD Motor Truck Co., W. Fayette St. & St. Marks Pl., Syracuse, N. Y.

SAURER—See International Motor Co.

SAYERS & Scovill Co., 2247-61 Colerain Ave., Cincinnati, O.

SCHACHT Motor Car Co., 2780 Spring Grove Ave., Cincinnati, O.

SCHLEICHER Motor Vehicle Co., Ossining, N. Y.

SCHLOTTERBACK Mfg. Co., L. E., Fourth Ave. & Ogden St., Newark, N. J.

SCHMIDT Bros. Co., 7027-33 S. Chicago Ave. (Grand Crossing), Chicago, Ill.

SELDEN Motor Vehicle Co., University Ave. & Probert St., Rochester, N. Y.

SERVICE Motor Car Co., Wabash, Ind. (See page 41.)

SIEBERT Motor Truck Co., 530 Ontario St., Toledo, O.

SMITH Co., A. O., Milwaukee, Wis. (See page 387.)

SPEEDWELL Motor Car Co. (Edgemont), Dayton, O.

SPOERER'S Sons Co., Carl, 901-09 S. Carey St., Baltimore, Md.

STANDARD Motor Truck Co., Detroit, Mich. (See page 50.)

STAPF & Co., John M., 228 Central Ave., Dunkirk, N. Y.

STAR-TRIBUNE Motor Sales Co., 815 Woodward Ave., Detroit, Mich. (Dealers.) (See page 51.)

STAVER Carriage Co., 76th & Wallace Sts., Chicago, Ill. (See page 48.)

STEARNS Co., F. B., Cleveland, O.

STEGEMAN Motor Car Co., 606 Linus St., Milwaukee, Wis.

STERNBERG Mfg. Co. (W. Allis), Milwaukee, Wis. (See page 43.)

STEWART Iron Works Co., 17th & Madison Sts., Covington, Ky.

STEWART Motor Corp., Superior & Randall Sts., Buffalo, N. Y.

STUDEBAKER, Detroit, Mich. (See page 28.)

SULLIVAN Motor Car Co., 1703 East Ave., Rochester, N. Y.

TARRYTOWN Motor Car Co., 1790 Broadway, New York, N. Y. "Motokart." (See page 50.)

TEEL Mfg. Co., Medford, Mass.

TOEPPNER Bros., Bay City, Mich.

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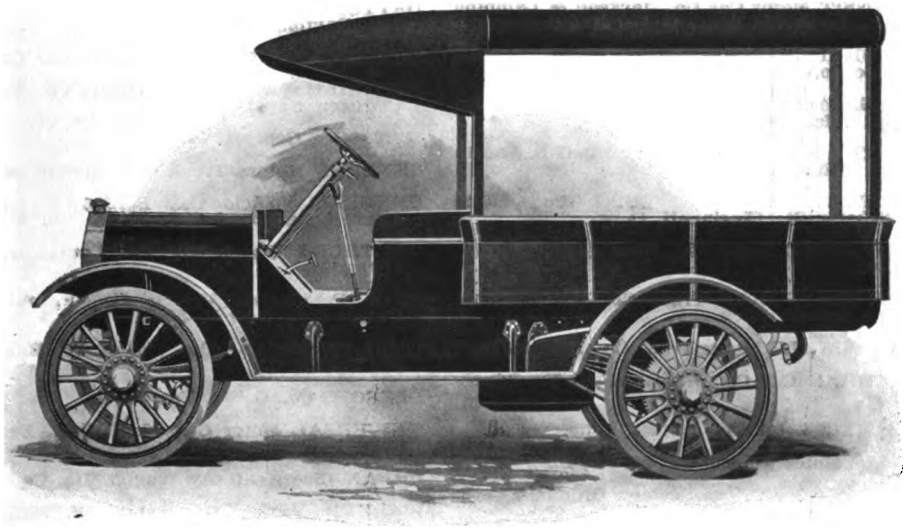
Service Motor Trucks



Model F—2,000 Pounds Capacity Complete, $1,300.

A Standard One Ton Truck built for the hardest kind of truck service. Responsible dealers who want to supply their customers with a high-grade truck, at the right price, should read our specifications, and write us about territory at once.

SPECIFICATIONS

Model F. Two Thousand Pounds Capacity

MOTOR	Rutenber, 4 Cylinder, En Bloc Type 3¼ x 5¼. Located at front.
HORSE POWER	30—35 H. P.
IGNITION	Dual System, Batteries and Magneto.
CARBURETOR	Stromberg, Type B No. 4, with Hot Air Tube.
TRANSMISSION	Double Disc Friction Patented. Bearings—4 sets Hyatt Roller Bearings. 2 sets Bower Roller Bearings. 2 sets U. S. Ball Bearings.
AXLES	Front and Rear. Weston-Mott Extra Heavy Section "I" Beam.
BRAKES	Internal Expanding, 14 in. diameter.
STEERING-GEAR	Non-Reversible Truck Type, on left side.
WHEELS	36 in. Artillery Type, 9¼ in. diameter. Flange Bearings, Two Point, Ball, ⅞ and ¾ diameter.
WHEEL BASE	115 in.
TIRES	36 x 3 in. Goodyear Clincher Truck Tires, front and rear.
SPRINGS	Semi-Elliptic, front and rear. 40 in. front, 46 in rear.
RADIATOR	Celleor Type.
FRAME	Pressed Steel Channel, 38 in. wide thru Body Section, inswept at front for short turning. Designed to take any style Body, back of Motor.
BODY	Optional, Flare-Board, Stake, Panel, or Roll Side Curtain Top.
LOADING SPACE	Back of Seat, 46½ in. wide x 7 ft. 6 in. long for Flare-Board or Panel Body 66" x 114" for Stake Body.
GASOLINE CAPACITY	23 Gallons.
SPEED	3 to 20 miles per hour.
EQUIPMENT	Two 10-in. Gas Lamps, two Side Oil Lamps, one Tail Lamp, and one Gas Generator.
LIGHTING	

SERVICE MOTOR CAR CO.

WABASH, INDIANA

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COMMERCIAL VEHICLES (Continued)

GASOLINE VEHICLES (Continued)

TRANSIT Motor Car Co., Jackson & Lampton Sts., Louisville, Ky.

TRIUMPH Motor Car Co., 3308 Sheffield Ave., Chicago, Ill.

TULSA Automobile & Mfg. Co., 20 W. Third St., Tulsa, Okla.

UNITED States Carriage Co., 309-19 S. Fourth St., Columbus, O.

UNITED States Motor Truck Co., 216-20 Webster St., Cincinnati, O.

UNIVERSAL Motor Co., Ideal Bldg., Denver, Colo.

UNIVERSAL Motor Truck Co., 500 Theodore St., Detroit, Mich.

VAN WINKLE Motor Truck Co., Atlanta, Ga.

VAUGHAN Car Co., Kingston, N. Y. "Commer."

VEERAC Motor Co., Anoka, Minn.

VELIE Motor Vehicle Co., Moline, Ill.

VULCAN—See Driggs-Seabury Ordnance Corp.

WAGENHALS Motor Car Co., 668-70 Grand River Ave., Detroit, Mich.

WALTER Motor Truck Co., 49-51 W. 66th St., New York, N. Y.

WARE Motor Vehicle Co., 771 Raymond Ave., St. Paul, Minn.

WASHINGTON Motor Car Co., Hyattsville, Md.

WESTMAN Motor Truck Co., 11008 Sturtevant Ave., Cleveland, O.

WHITE Co., Cleveland, O. (See Back Cover.)

WHITE Star Motor & Engineering Co., 16-20 Henry St., Brooklyn, N. Y.

WICHITA Falls Motor Co., Wichita Falls, Tex.

WILCOX Motor Car Co., H. E., 1030 Marshall St., N. E., Minneapolis, Minn.

WILLYS-OVERLAND Co., Dept. 142, Toledo, O. "Overland." (See page 31.)

ELECTRIC VEHICLES

ANDERSON Electric Car Co., Riopelle St. & Clay Ave., Detroit, Mich. "Detroit."

ARGO Electric Vehicle Co., Saginaw, Mich.

ATTERBURY Motor Car Co., Hertel & Elmwood Aves., Buffalo, N. Y.

BAKER Motor Vehicle Co., Edgewater Park & L. S. & M. S. Ry., Cleveland, O.

BUFFALO Electric Vehicle Co., 1227 Main St., Buffalo, N. Y.

CHICAGO Electric Motor Car Co., 3612-18 S. Morgan St., Chicago, Ill.

CLEVELAND-GALION Motor Truck Co., Primrose St., Galion, O.

COMMERCIAL Truck Co. of America, 27th & Brown Sts., Philadelphia, Pa.

COUPLE-GEAR Freight-Wheel Co., 1450 Buchanan St., Grand Rapids, Mich.

DAYTON Electric Car Co., Fourth & St. Clair Sts., Dayton, O.

DETROIT—See Anderson Electric Car Co.

FRITCHLE Automobile & Battery Co., 1510-30 Clarkson St., Denver, Colo.

G. V.—See General Vehicle Co.

GENERAL Motors Truck Co., Pontiac, Mich.

GENERAL Vehicle Co., Borden & Review Aves., Long Island City, N. Y. "G. V."

KENTUCKY Wagon Mfg. Co., Louisville, Ky. "Urban."

M. & P. Electric Vehicle Co., Franklin & Dubois Sts., Detroit, Mich.

OHIO Electric Car Co., 1501-07 W. Bancroft St., Toledo, O.

PARSONS Co., G. W., Newton, Ia.

UNIVERSAL Motor Co., Ideal Bldg., Denver, Colo.

URBAN—See Kentucky Wagon Mfg. Co.

WALKER Vehicle Co., 531-45 W. 39th St., Chicago, Ill.

WARD Motor Vehicle Co., E. 142d St. & Concord Ave., New York, N. Y.

WAVERLEY Co., 139 S. East St., Indianapolis, Ind.

STEAM VEHICLES

MICHIGAN Steam Motor Co., 443 Lincoln Ave., Detroit, Mich.

IMPORTED VEHICLES

ARIES—See Jaccard & Co.

BENZ Auto Import Co., 250 W. 54th St., New York, N. Y. "Gaggenau."

BUSSING Agency, 1777 Broadway, New York, N. Y.

DE DION-BOUTON Selling Branch, 1649 Broadway, New York, N. Y.

DUCASSE & Co., Henry, 733 Seventh Ave., New York, N. Y. "Orion."

GAGGENAU—See Benz Auto Import Co.

HEALEY & Co., Broadway & 51st St., New York, N. Y. "Panhard."

JACCARD & Co., J., 213 W. 69th St., New York, N. Y. "Aries."

ORION—See Ducasse & Co.

PANHARD—See Healey & Co.

Complete Index to Classification appears on Pages 8 to 22.

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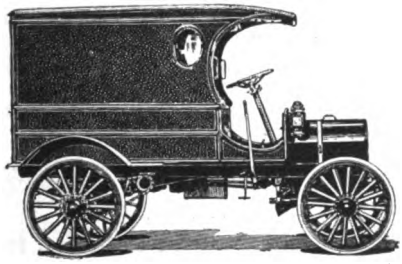
CHASE

The Emblem of Efficiency.



Model D Panel Top. Capacity 1000 lbs. Price $1050.

For Actual Service CHASE TRUCKS Give Constant Satisfaction

SIX MODELS 500 To 4000 POUNDS CAPACITY

ALL STYLES OF BODIES

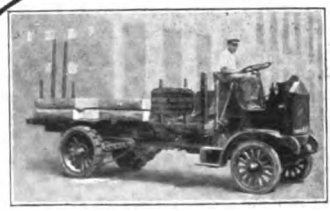
Up to two tons capacity the Chase line is the most complete and varied shown anywhere. For catalogue and further information, address

CHASE MOTOR TRUCK COMPANY

SYRACUSE, N. Y.

Sternberg

BUILT FOR ETERNITY



2, 3, 4 & 5 TON CAPACITIES

The Sternberg truck now enters its 7th year of successful service. Its makers are among the pioneer truck builders in America. Satisfied users in more than a hundred different industries testify that the Sternberg ideal, to build the best truck made, has been realized.

No trouble to sell the Sternberg in competition with any other truck and then, after you have sold the truck, it does not eat up your profit, trying to keep your customer satisfied.

Good territory open to high class agents

STERNBERG MFG. CO.,

West Allis, Milwaukee, Wis

America's First Cycle-Car Is

Woods Mobilette

The Only American Cycle-car backed by 18 months of test service and a valid guarantee.

Wheel Base 98 inches—Tread 30 in.—Over-all 35 in.

No Garage Expense—It will pass through any standard width door of 36 or more inches, into hall, kitchen, basement, office or store.

Ideal either for pleasure or business purposes.

Delivery Body can be substituted for seats in two minutes—can be loaded at counter.

Special attachable limousine top for social purposes or physicians and other professional people. Excellent in stormy or cold weather.

Engine is four cylinder, air-cooled, making 14 H.P. Transmission is two speeds forward and reverse, planetary type.

Weight about 450 lbs. Price $350 and up depending upon bodies wanted, etc.

Agents wanted—Address:

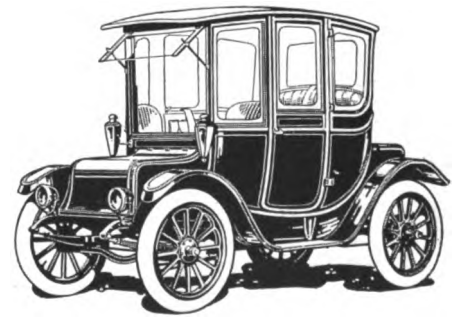
WOODS MOBILETTE COMPANY

EXECUTIVE OFFICE,

1013 SECURITY BLDG., CHICAGO

Salesrooms and Temporary Factory, 1509 Michigan Blvd., Chicago.

The LUXURIOUS BROC



An electric car that should interest every dealer in high-grade gas cars. The BROC has no quality-competition.

The BROC ELECTRIC VEHICLE COMPANY

Payne and Fortieth Streets CLEVELAND

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COMMERCIAL VEHICLES (Continued)

TAXICABS

CROXTON Motor Car Co., Washington, Pa.

FORD Motor Co., Woodward Ave., Detroit, Mich.

PULLMAN Motor Car Co., York, Pa. (See page 37.)

THOMAS Motor Cab Co., 184-88 W. Mohawk St., Buffalo, N. Y.

WHITE Co., Cleveland, O. (See Back Cover.)

MOTOR PROPELLED FIRE APPARATUS

ADAMS Bros. Co., Findlay, O.

AHRENS-FOX Fire Engine Co., Alfred & Cook Sts., Cincinnati, O.

AMERICAN-LA FRANCE Fire Engine Co., Elmira, N. Y.

ANDERSON Coupling & Fire Supply Co., Sixth St. & Reynolds Ave., Kansas City., Kans.

AUTOCAR Co., Ardmore, Pa.

BOYD & Bro., Jas., 25th & Wharton Sts., Philadelphia, Pa.

COUPLE-GEAR Freight-Wheel Co., 1450 Buchanan St., Grand Rapids, Mich.

FEDERAL Motor Truck Co., Detroit, Mich.

HOWE Engine Co., Indianapolis, Ind.

KELLY-SPRINGFIELD Motor Truck Co., Burt & Sheridan Sts., Springfield, O.

KISSEL Motor Car Co., 121 Kissel Ave., Hartford, Wis.

KNOX Automobile Co., 53 Wilbraham Rd., Springfield, Mass.

LIPPARD—Stewart Motor Car Co., 1738 Elmwood Ave., Buffalo, N. Y.

LOCOMOBILE Co. of America, 2 Main St., Bridgeport, Conn.

LUITWEILER Pumping Engine Co., 123 Ames St., Rochester, N. Y.

NOTT Fire Engine Co., 1624 Central Ave., Minneapolis, Minn.

OLDS Motor Works, Lansing, Mich.

PACKARD Motor Car Co., N. Grand Blvd. & Belt Line, Detroit, Mich.

PEERLESS Motor Car Co., Quincy Ave. & S. E. 93d St., Cleveland, O.

POPE Mfg. Co., 436 Capital Ave., Hartford, Conn.

ROBINSON Fire Apparatus Mfg. Co., 4250-68 N. 20th St., St. Louis, Mo.

ROCHESTER Motor Fire Pump Co., Granite Bldg., Rochester, N. Y.

SEAGRAVE Co., Columbus, O.

WATEROUS Engine Works Co., 62 S. Robert St., St. Paul, Minn.

WEBB Co., Allentown, Pa.

WHITE Co., Cleveland, O. (See Back Cover.

Complete Index to Classification appears on Pages 8 to 22.

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1914
Herreshoff

THE THOROUGHBRED CAR

Electric Self-Cranking, Electrically Lighted Four Forward Speeds

"Six 40" Touring Car & Roadster $1850
4-30 Touring Car $1350
4-30 Roadster $1250

Live wire dealers write for unallotted territory

HERRESHOFF MOTOR CO., Detroit, Mich., U. S. A.

The New Model "D" Howard Six is ready

$2375.00

Immediate deliveries

5 Passenger Touring Body.
130" Wheel Base.
Continental 4⅛" x 5¼" Six-Cylinder Motor.
Unit Power Plant.
Timken Axles, front and rear.
Firestone Demountable Rims.
36" x 4½" U. S. Tires.
Electric Lights and Starter.
The Moore Double Exhaust System, insuring proper ignition in each of the six cylinders all of the time.

This powerful silent six was designed by a real artist, and looks it.

Dealers can arrange for open territory.

Howard Motor Car Co., Connersville, Indiana

EMPIRE

"The Little Aristocrat"

COMPLETELY EQUIPPED $950

Model 31. 108-in. Wheel Base. 5 Passenger.

Demountable Rims
One Extra Rim
Mohair Top
Top Envelope
Enclosing Curtains
Shock Bumpers
Windshield
Double Tire Irons
Horn under Hood
Eisemann Magneto
Robe and Foot Rail
Oversize Tires
Tool and Tire Kits
Prest-O-Lite Tank
Gas Head Lights
Oil Side and Tail Lights
Pump and Jack
Dash Air Adjustment
Foot Accelerator
Speedometer
Oil Sight Feed

Empire Automobile Company
Indianapolis, U. S. A.

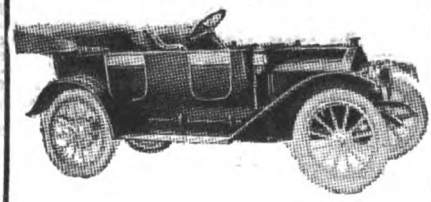
Great Western FORTY

With Automatic Engine Starter.

For Dependability, Power, Speed and Utility, the "Great Western Forty" has never been surpassed by any car, at any price. Handsomely finished and equipped.

LIVE DEALERS EVERYWHERE will find the Great Western a great money maker. Some choice territory is still left. Better write to-day for our great offer to dealers.

Great Western Automobile Co.
PERU, INDIANA



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METZ—$475

The Gearless Car
Winner of the Glidden Tour

The METZ "22," just as shown here, with 22½ h.p. four-cylinder, water-cooled motor, Bosch magneto, standard artillery wheels and best quality Goodrich clincher tires, gas lamps and gas generator, oil dash lamps and tail light, extension top, wind shield, tool outfit, etc., $475.

With Electric Equipment, including best electric starter on the market, electric lights and electric horn, $600.

METZ Speedster, fitted with wire wheels, individual seats, nickeled trimmings, and electric head lights, $500.

Write for illustrated catalog, "A. D."

METZ COMPANY
WALTHAM, MASS., U. S. A.

Maxwell Cars—The Dealer's Line

A complete line all under one name has many advantages.
Think it over!

MAXWELL "50-6"—7 passenger, Electric Starter, 133" Wheel Base, $1975 fully equipped.

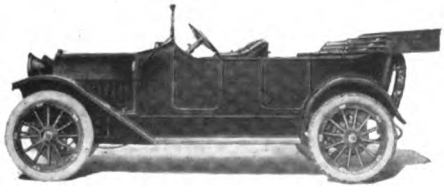
MAXWELL "35-4"—5 passenger, Acetylene Starter, 111" Wheel Base, $1085 fully equipped; $1225 with electric starter and lights.

MAXWELL "25-4"—5 passenger, 103" Wheel Base, $750 fully equipped.

Send for complete catalog

Maxwell Motor Co.,
Incorporated
Detroit, U. S. A.

PAIGE



PAIGE 36, $1275

Long stroke motor, unit power plant, 116 in. wheelbase, 34 x 4 in. wheels, cork insert multiple disc clutch, silent chain drive for pump, cam and magneto shafts, Bosch magneto and many other remarkable features.

PAIGE 25, $975

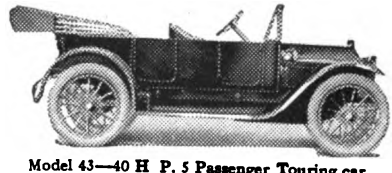
Unit power plant, 110 in. wheelbase, 32 x 3½ in. wheels, cork insert multiple disc clutch, Bosch magneto and just as remarkably priced as the Paige 36.

Both models are electrically started and lighted and fully equipped, including rain vision and ventilating windshields, quickly adjusted inside curtains, non-skid tires in rear, demountable rims, tire carriers, foot and robe rails, license brackets, tools, etc., complete.

Attractive dealers proposition for few open territories.

PAIGE-DETROIT MOTOR CAR COMPANY
DEPARTMENT C. DETROIT, MICHIGAN

Paterson



Model 43—40 H. P. 5 Passenger Touring car Price, $1,600.00
Model 47—45 H. P. 7 Passenger Touring car Price, $1950.00

All Paterson Cars Have

Long Stroke Motors, Long Wheel-base, Unit Power Plant, Three Point Suspension, Complete Equipment, Electric Lights, Self Starters.

And all the tried-out successful devices that tend to reduce the up-keep and improve the riding qualities and ease of operation.

W. A. PATERSON CO
Flint, Michigan

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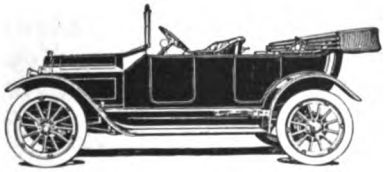
The
FAMOUS APPERSON JACK-RABBIT CARS
For the Twenty-first Year

"4-45" Touring car for five	$1785
Light "4-45" Touring car for five	$1600
"4-45" Roadster for two	$1600
"4-45" Coupé	$2350
"4-45" Sedan Limousine	$2500
"6-55" Touring car for five	$2350

All Models With
Electric Starter and Lights

APPERSON BROS. AUTOMOBILE CO. Kokomo, Indiana



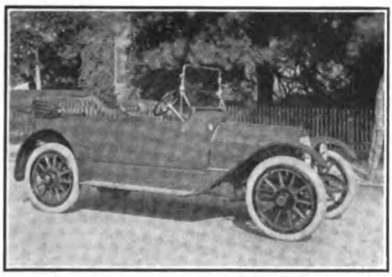
"NONE AS EASY RIDING"
The King cantilever springs reduce road shock, vibration and side swing and give LONG LIFE TO YOUR CAR.

THE NEW KING
$1095

30 Horse Power, unit power plant, center control, left hand steer, electric lights, 14" x 2¼" brake drums, 112" wheel base, multiple disc clutch.

A STYLISH CAR CAREFULLY MANUFACTURED FROM MATERIALS OF GOOD QUALITY.

KING MOTOR CAR COMPANY, 1300-1304 Jefferson Ave., Detroit, Michigan, U. S. A.



A361 GSABA..55, collect N.L.
Los Angeles, Cal., July 13, 1913.
PALMER & SINGER CO.,
2638 Michigan Avenue, Chicago, Ill.

Completed our trip across the continent in Brighton Six last night. While the car is weather beaten, it is running perfectly and I know of nothing broken or out of adjustment. It never faltered in the mountains or on the desert and no car could have landed us here with greater safety or comfort.

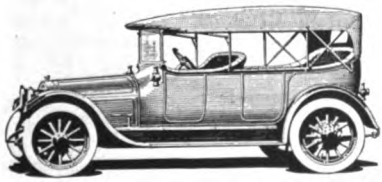
CHAS. B. PHILLIPS. 4.17 A.M.

The above exemplifies the standard of construction of Palmer-Singer cars. The result of seven years' experience.

Write now for information.

PALMER & SINGER MANUFACTURING CO. Long Island City New York City

Stevens-Duryea



LIVE DEALERS WANTED IN OPEN TERRITORY

Stevens-Duryea Co.,
Chicopee Falls, Mass.

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Two Fours and a Six —one Chassis Design

¶ Only one chassis design can be "best"—that's why we use the same construction on the MOON "39" (a four), the MOON "48" (a four), and the MOON "65" (a six).

¶ The different models vary in size only.

Moon Motor Car Co.
Saint Louis

DEALERS:

I Have a Very Special Proposition to Offer You for 1914. Harry B. Staver

Write at once for full particulars of my unique 1914 Dealer's Proposition.

The 1914 Staver is a genuine revelation—our 1914 Dealer's proposition is worthy of this wonderful car. Get the whole story—write now.

STAVER

Staver Carriage Co., 76th and Wallace Sts., Chicago

Rauch & Lang Electrics

are Nationally Advertised. Every magazine of repute carries the Rauch & Lang message. The selling of Rauch & Lang Electrics will prove most profitable. Write us regarding our sales plan if you are contemplating entering the automobile business.

THE RAUCH & LANG CARRIAGE COMPANY
2180 West 25th Street, Cleveland, Ohio

Abbott-Detroit

Continental Motors, Electric Self-Starter, Electric Lights, Underslung Springs, 12-inch Upholstery, Goodyear No-Rim-Cut Tires, Booth Demountable Rims, Jiffy Curtains, Speedometer with Clock Combination, Tire Brackets, Gasoline Gauge, and scores of other leading features.

34-40 3-Pass. Roadster, 116-inch wheelbase $1700
30-40 5-Pass. Touring Car, 116-inch wheelbase $1700
34-40 3-Pass. Colonial Coupe, 116-inch wheelbase $2000
44-50 5-Pass. Demi-Tonneau, 121-inch wheelbase $1975
44-50 7-Pass. Touring Car, 121-inch wheelbase $2000
44-50 Battleship Roadster, 121-inch wheelbase $2150
44-50 7-Pass. Limousine, 121-inch wheelbase $3050

Top, Windshield and Speedometer, $100 Extra

ABBOTT MOTOR COMPANY
650 WATERLOO STREET DETROIT, MICHIGAN

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COLE

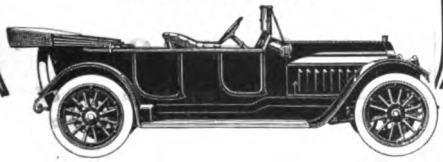
The Standardized Car

The Standardized Car—the Cole—is built entirely of perfectly interrelated parts—*standardized* parts—a standardized part being any part which has been built so well that it becomes the *standard* whereby all other similar parts are measured.

The New Series Nine Cole comes in four and six cylinder chassis, *selling completely equipped* for $1,925 and $2,600 respectively.

Write today for New Cole Blue Book—and special offer to live dealers.

Cole Motor Car Company
Indianapolis



DEALERS !!!

For Light Commercial Cars 1000 to 2000 lbs. Capacity. Write

Flint Motor Wagon Dept.
Durant-Dort Carriage Co.
Flint, Michigan

New Auburn

Completely Equipped --Electric Self-Cranking System, Electric Lights, Electric Horn

$1490!

Do not take on any car until you have judged the astonishing sales possibilities of the New Auburn "40." Write today for new folder.

THIS is 1914's *startling* value—a large, beautiful, 120-inch wheelbase car, equipped with every luxury and convenience of high-priced cars. At $1490!

Note these advanced features:

Left Drive **Center Control**
Electrically Self-Cranked
Electric Lighted **Electric Horn**
Rain-Vision Ventilating Windshield
36x4 Tires; Demountable Rims
Full Floating Rear Axle
Cowl Dash
Turkish Type Upholstery—Finest of Leathers
Wide Doors (With Concealed Hinges) as on 1914 European Cars
Dustproof En-Bloc T-Head Motor
Extra Roomy Tonneau—29 Inches Foot Room
Tire Irons with Extra Demountable Rim

This car is now on exhibit at show rooms of nearest Auburn dealer—write for his address and the new, complete descriptive folder to

AUBURN AUTOMOBILE CO., Auburn, Ind.

Detroiter

Five Passenger Touring Car—32 H. P. Long Stroke Motor

Detroiter—Remy Self Starting and Lighting System Extra

Enclosed Valves, Three Point Suspension, Unit Power Plant, Platform Rear Springs, Full Floating Rear Axle, Left Hand Drive, Center Control, Drop Frame, Large Tires, Complete Ball Bearing Car. Also Roadster and Speedster models, and a wide variety of equipment.

$850 to $1050

Briggs-Detroiter Co.

537 Holbrook Ave. **Detroit, Mich.**

Write for Specifications

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Standard

THREE TON
MOTOR TRUCKS

$2750

Here is the truck that established a new standard of truck value. It embodies such well-known "quality" as Continental Motor, Timken Axles, etc.

Get a catalog.

Standard Motor Truck Co.
Detroit, Mich.

110 Armleder Motor Wagons

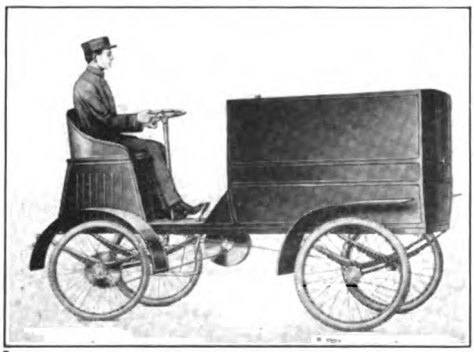
Cover day in day out the hardest territory in the United States and they do it efficiently and economically.

3 Models. 2000, 3000 and 4000 pounds capacity.

For fullest details of our most attractive dealer's proposition please communicate with

The O. Armleder Co.
Cincinnati, O.

The World's largest factory of high grade business wagons.



The MOTOKART was the first four-wheel car specially designed and built for parcel delivery service. Capacity 400 lbs. Price $400.00.

Live Dealers Wanted Everywhere.
If not represented in your town write to-day for full specifications and agency terms.

TARRYTOWN MOTOR CAR CO.,

Factory: Tarrytown, N. Y.
New York Office: 1790 Broadway

Address all agency inquiries to New York

Blair Trucks

Dealers Get Wise To This

All the leading truck manufacturers in Europe and America are coming to a realization of direct worm drive for trucks.

BLAIR TRUCKS, by the adoption of the worm drive and the elimination of universal joints, are the embodiment of perfect alignment, greatest possible application of power, and the smallest possible upkeep expense.

Write for our booklet.

Blair Mfg. Co.
NEWARK, O.

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WE HAVE SOLD

Under Contract Since the First Day of Last May

A GRAND TOTAL OF 425 ONE and TWO TON TRUCKS	$571,250
A GRAND TOTAL OF 1450 "O. K." Light Delivery Trucks	1,232,500
THIS IS A TOTAL BUSINESS of	$1,803,750

All of our territory is not closed yet.

Among Our Prominent Dealers are

Theodore Tietze, BERLIN AND PARIS, for FOUR YEARS European distributors for Hupmobiles. Mr. Tietze handles Europe for us.
Co-operative Motor Car Company, BUFFALO AND NEW YORK CITY. Eastern Representative.
E. H. Hawley and Co., Wheeling, West Va.
AUSTIN DOYLE and SON, Chicago, Ill.
Vulcan Bessmer Sales Co., Youngstown, Ohio; Southern half Ohio.
Bellamore-Toomey Co., 10 Bridge St., New York City; Australia.
Z. B. Chase, Toronto, Ont. P. O.
A. G. Peterson, Davenport, Ia., State of Iowa.
L. A. LaPlatte Co., Los Angeles, Southern half California.
Star Tribune Motor Sales Company, 815 Detroit, Mich., State of Michigan.

Two Models

Model "A" 2 Ton $1850. 144" Wheel Base.
Model "B" 1 Ton 1400. 125" Wheel Base.

"O.K" Light Delivery

Model "A" Panel Body $850.00
Model "B" Open Express 850.00.

Everything Standard Radiator to Tail Light.

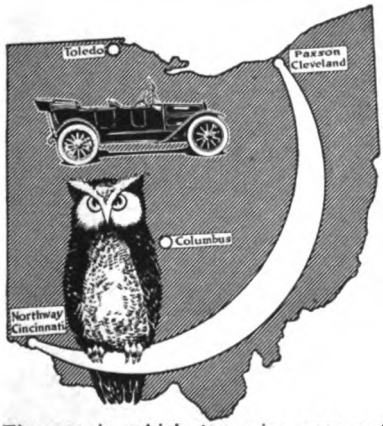
A light delivery car, shaft driven, selective transmission, fully complete, windshield, lamps, body, tools and all—for $850.00.
GET THE ONLY COMPLETE COMMERCIAL CAR AGENCY IN THE WORLD, Write or Wire

STAR-TRIBUNE MOTOR SALES CO.

815 Woodward Ave., DETROIT, MICH.

NORTHWAY'S NEW CAR

THE MASTER ACHIEVEMENT OF R. E. NORTHWAY



The car in which the wise ones put their trust.

Ohio
Model
4 Cyl.
$1275.00
Royal
Model
6 Cyl.
$1985.00

The car with 14 ideal features.

The "Crescent" joins the famous designing and manufacturing ability of Northway to the selling plant of Paxson in a "Concentration" of effort to produce the best and an "Elimination" of expense to keep the price down.
These two models have proven to be the best sellers on the market today. Are you one of the dealers to get your share?

THE CRESCENT MOTOR CO.

W. T. HUNTER, President, Cincinnati, O.

C. D PAXSON, Gen. Sales Mgr.
1900 Euclid Ave., Cleveland, O.

BELLAMORE & TOOMEY
10 Bridge St., N. Y. City

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SHALER

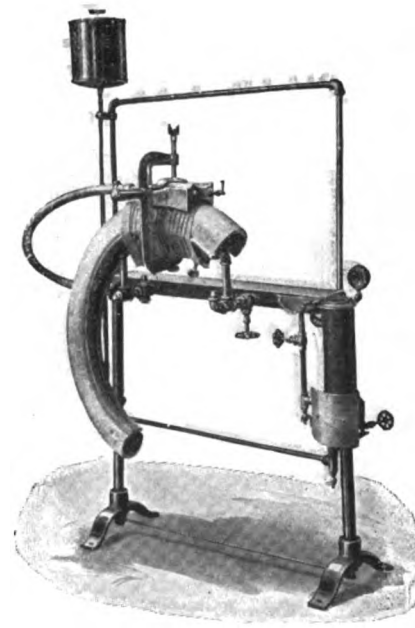
Vulcanizers

Keep Tires in Perfect Condition

The Shaler is the "Standard" vulcanizer used by the best garages and repair shops everywhere. We make the only complete line of vulcanizers—from the $3.50 Shaler Vul-Kit to complete Garage Equipment. We are the largest manufacturers of vulcanizers in the world, and our complete line includes vulcanizers of every type—Electric, Gasoline, Alcohol and Steam, for every requirement.

Dealers—Garages —Repair Shops

The Shaler is the only vulcanizer with Automatic Heat Control. More Shaler Vulcanizers are sold than of all other makes combined—and every Shaler is Guaranteed. Many dealers make $15 to $20 a day extra profit vulcanizing tires with Shaler Vulcanizers. Accessory Dealers find them quick sellers that give perfect satisfaction. Every Garage and Repair Shop needs a Shaler Vulcanizer for its own use, and can increase its profits by selling them to motorists to use at home. The Vulcanizer is the only accessory never furnished with any car's equipment, and every motorist needs one. Get full information—with Special Dealer's Book —"Common Sense About Tire Repairs."



C. A. SHALER COMPANY

904 Fourth Street Waupun, Wisconsin, U. S. A.

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Accessories, Parts, Materials and Supplies

PART II

Classified lists of the Manufacturers of Component Parts, Accessories, Materials and Supplies

A complete index to classifications appears on pages 8 to 22

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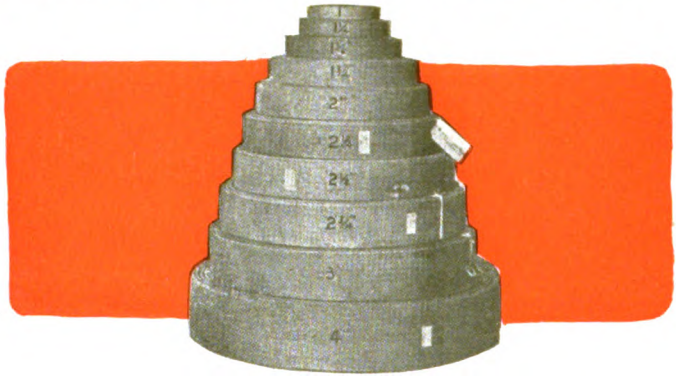
Ambesco

BRAKE LINING



Manufacturers who realize that their good reputation is at stake every time a car with their name gets into an accident, should equip those cars with AMBESCO BRAKE LINING—The kind that always grips—never slips.

Owners who have it on their cars play safe—because AMBESCO is made of pure asbestos interwoven with copper wire. We guarantee it **not** to burn, char, or be affected in any way by oil, water, grease, or dust.

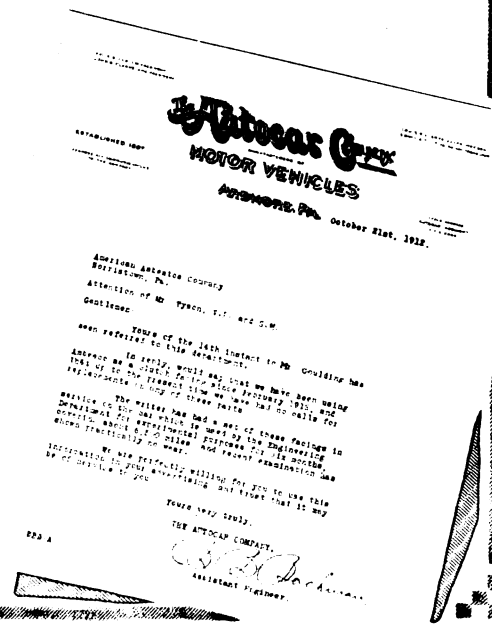
Purchasing agents looking for the most efficient brake lining at attractive prices should write for samples and price list—today.

JOBBERS AND DEALERS

AMBESCO makes good profits all around because it makes **good** for the motorist.

Every Dealer and Jobber in the country who wants to do a bigger, better, and more profitable Brake Lining business in 1914 should get the details of our new selling plan. Write To-Day—Now.

American Asbestos Co.
Norristown Pa.



The Autocar Company
MOTOR VEHICLES
ARDMORE, PA.

October 31st, 1913.

American Asbestos Company
Norristown, Pa.

Attention of Mr. Tyson, T.F. and S.W.

Gentlemen:

Yours of the 14th instant to Mr. Goulding has been referred to this department.

In reply, would say that we have been using Ambesco as a lining for the block brakes on our trucks for the past three years. We have had no calls for replacements during that time.

The writer has had a very of these linings in service on his car which is used by the Engineering Department, and performed very well for the purpose for which it is intended. Our experience has shown practically no wear. And recent examination has

We are perfectly willing for you to use this information in your advertising, but trust that it may be of benefit to you.

Yours very truly,

THE AUTOCAR COMPANY,

Assistant Engineer.

RPS A

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Part II

PARTS AND ACCESSORIES

ACID

BATTERY ACID

(See Electrolyte, Battery)

SOLDERING ACID

(See Flux, Soldering)

ADAPTERS

ACETYLENE LAMP ADAPTERS

(For converting oil or electric lamps into acetylene lamps)

FERGUSON—See Gibson Distributing Co.

GIBSON Distributing Co., Times-Leader Bldg., New Haven, Conn. "Ferguson." (See page 243.)

ELECTRIC LAMP ADAPTERS

(For converting gas or oil lamps into electric lamps)

APELCO—See Apple Electric Co.

APPLE Electric Co., 16 Canal St., Dayton, O. "Apelco." (See page 159.)

ARSENO Electric Co., 819A Boylston St., Boston, Mass.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Cello."

CELLO—See Campbell Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

COMET—See Dietz Co.

CULVER-STEARNS Mfg. Co., Worcester, Mass. (See page 243.)

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Comet."

FAW, J. H., 41 Warren St., New York, N. Y. "Fawsco." (See page 585.)

FAWSCO—See Faw, J. H.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GENERAL Electric Co., Schenectady, N. Y.

GIL-BO—See Metal Specialties Mfg. Co.

GRAY & Davis, Boston, Mass. (See page 407.)

HAMMER Co., E. H., 1839 Euclid Ave., Cleveland, O.

HANDY—See Chicago Electric Mfg. Co.

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Gil-Bo."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco." (See page 153.)

S-H.—See Stuart-Howland Co.

STUART-HOWLAND Co., 131-41 Federal St., Boston, Mass. "S-H."

ALARMS

BOILER ALARMS

(See Columns, Water)

TIRE ALARMS

(For sounding an alarm when tires are under or over inflated)

CLEVELAND, C. C., Boulder, Colo.

POLO Pneumatic Alarm Mfg. Co., Clear Lake, S. Dak.

TERPENING, E. A., Mokena, Ill.

Complete Index to Classification appears on Pages 8 to 22.

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ALCOHOL

DENATURED ALCOHOL

PYRO—See United States Industrial Alcohol Co.

UNITED States Industrial Alcohol Co., 27 William St., New York, N. Y. "Pyro."

WOOLNER Distilling Co., ft. Spillman St., Peoria, Ill.

ALUMINUM

SHEET AND ROD ALUMINUM

(For Aluminum Castings—See Castings, Aluminum)
(For Aluminum Tubing—See Tubing, Aluminum)

ALUMINUM Co. of America, Pittsburg, Pa.

FRASSE & Co., Peter A., New York, N. Y. (Importers.) (See page 589.)

AMMETERS

STANDARD AMMETERS AND VOLTMETERS

(For switchboard and electric vehicle use. For Pocket Meters—See Gauges, Battery)

CLARK Electric Meter Co., 219 S. Clinton St., Chicago, Ill.

GENERAL Electric Co., Schenectady, N. Y.

HOSKINS Mfg. Co., 453 Lawton Ave., Detroit, Mich. "International."

HOYT Electrical Instrument Works, Penacook, N. H. (See page 565.)

INTERNATIONAL—See Hoskins Mfg. Co.

JEWELL Electrical Instrument Co., 810 W. Lake St., Chicago, Ill.

KEYSTONE Electrical Instrument Co., Ninth St. & Montgomery Ave., Philadelphia, Pa.

NORTON Electrical Instrument Co., Manchester, Conn.

PIGNOLET, Louis M., 78 Cortlandt St., New York, N. Y.

QUEEN-GRAY Co., 616-18 Chestnut St., Philadelphia, Pa.

RELIANCE Instrument Co., 1135 Van Buren St., Chicago, Ill.

ROLLER-SMITH Co., 203-05 Broadway, New York, N. Y.

TROY Electrical Co., River & State Sts., Troy, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTERN Electric Co., 463 West St., New York, N. Y.

WESTON Electrical Instrument Co. (Waverly Park), Newark, N .J. (See page 527.)

ANNUNCIATORS

AUTOMOBILE ANNUNCIATORS

(For signaling from passenger to driver. For Speaking Tubes—See Tubes, Speaking. For Limousine Telephones—See Telephones, Limousine)

COWLES & Co., C., New Haven, Conn. (See page 177.)

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

ANTI-RATTLERS

DOOR ANTI-RATTLERS

ADAMS Mfg. Co., Kansas City, Mo. "Perfect."

COLE, Frank, 162 Perry St., Pontiac, Mich.

N. E. Auto Door Bumper Co., Rindge Ave. (N. Cambridge), Cambridge, Mass.

PERFECT—See Adams Mfg. Co.

ASBESTOS

SHEET ASBESTOS

(For Asbestos Packing—See Packing, Asbestos)

AMERICAN Asbestos Co., Norristown, Pa. (See page 54.)

CAREY Co., Philip (Lockland), Cincinnati, O.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

KEASBEY & Mattison Co., Ambler, Pa.

SALL Mountain Asbestos Mfg. Co., 230 S. LaSalle St., Chicago, Ill.

WATSON Co., H. F., Erie, Pa.

AXLES

CYCLECAR AXLES
(Front and Rear)

(For Axle Forgings—See Forgings, Drop.)

DETROIT Commercial Axle Co., 30 21st St., Detroit, Mich.

FRONT AXLES

AMERICAN Ball-Bearing Co., Cleveland, O. (See page 57.)

AMERICAN Gear & Mfg. Co., S. Park Ave., Jackson, Mich.

BILLINGS & Spencer Co., Hartford, Conn.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 607.)

DUNLAP Mfg. Co., Columbus, O.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

GILL & SONS Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y. (See page 447.)

GREENVILLE Metal Products Co., Greenville, Pa.

HESS Spring & Axle Co., Carthage, O. (See page 579.)

HIGGINS Spring & Axle Co., 1314 16th St., Racine, Wis. (See page 375.)

HOUK Mfg. Co., Buffalo, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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American Axles

Acknowledged The Highest Class Axles That Are Placed In Any Motor Car.

STUDY the best Bevel or Worm Drive Axles imported from Europe for either gasoline or electric pleasure cars, and you will be in a position to appreciate the superiority of "*American*" Axles.

That *American* Axles, judged by any given standard, have no serious rivals on this side of the Atlantic, will not, of course, be questioned.

Built with rigid insistence upon highest quality in every detail, they are naturally found only on cars of corresponding quality in all other respects.

Direct comparison of these axles with the best products of foreign makers, prove positively that *American* Axles concede nothing to any other axle —wherever built.

This excess of quality furnished by *American* Axles is a direct advantage to the car owner, because mileage and maintenance depend directly upon axle efficiency.

Axles alone offer the option of the highest class of Bevel or Worm gears. Both are fitted throughout by us with the best types of foreign made ball-bearings.

The adjusting and full floating features of *American* Axles are fully covered by our own patents and by shop rights from other patentees.

THE AMERICAN BALL-BEARING CO.

CLEVELAND, OHIO

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AXLES (Continued)

FRONT AXLES (Continued)

JACOBSON Machine Mfg. Co., Warren, Pa. (See page 531.)

KRUPP—See Prosser & Son.

LEWIS Spring & Axle Co., Jackson, Mich.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa. (See page 383.)

McINTYRE Mfg. Co., 172-82 W. Locust St., Columbus, O.

METAL Products Co., Detroit, Mich. (See page 537.)

MOTT Wheel Works, Utica, N. Y. (See page 349.)

MUNCIE Gear Works, Muncie, Ind.

MURRAY Mfg. Co., Park Bldg., Pittsburg, Pa.

PATHFINDER—See Weaver Co.

PERU Auto Parts Mfg. Co., Peru, Ind.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

RUSSEL Motor Axle Co., Detroit, Mich. (See page 155.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y. (See page 363.)

SHELDON Axle Co., Wilkes-Barre, Pa. (See page 59.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

TIMKEN-DETROIT Axle Co., Detroit, Mich.

WALKER-WEISS Axle Co., Flint, Mich.

WEAVER Co., Geo. A., Newport, R. I. "Pathfinder."

WESTON-MOTT Co., Flint, Mich. (See page 209.)

REAR AXLES

AMERICAN Ball-Bearing Co., Cleveland, O. (See page 57.)

AMERICAN Gear & Mfg. Co., S. Park Ave., Jackson, Mich.

CHAUTAUQUA Motor Co., Dunkirk, N. Y., "D. C."

COVERT Motor Vehicle Co., Detroit, Mich. (See page 573.)

D. C.—See Chautauqua Motor Co.

DODGE Bros., 1678-1724 Jos. Campau Ave., Detroit, Mich.

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa. (See page 607.)

DUNLAP Mfg. Co., Columbus, O.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

GREENVILLE Metal Products Co., Greenville, Pa.

HESS Spring & Axle Co., Carthage, O. (See page 579.)

HOUK Mfg. Co., Buffalo, N. Y.

JACOBSON Machine Mfg. Co., Warren, Pa. (See page 531.)

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa. (See page 383.)

McINTYRE Mfg. Co., 172-82 W. Locust St., Columbus, O.

METAL Products Co., Detroit, Mich. (See page 537.)

MOTT Wheel Works, Utica, N. Y. (See page 349.)

RUSSEL Motor Axle Co., Detroit, Mich. (See page 155.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y. (See page 363.)

SHELDON Axle Co., Wilkes-Barre, Pa. (See page 59.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

TIMKEN-DETROIT Axle Co., Detroit, Mich.

TORBENSON Gear & Axle Co., 220 High St., Newark, N. J.

WARNER Mfg. Co., Toledo, O. (See page 481.)

WAYNE Auto Axle Co., Fort Wayne, Ind. (See page 517.)

WESTON-MOTT Co., Flint, Mich. (See page 209.)

REAR AXLES WITH TRANSMISSION

AMERICAN Gear & Mfg. Co., S. Park Ave., Jackson, Mich.

COVERT Motor Vehicle Co., Detroit, Mich. (See page 573.)

EVANS—See Merchant & Evans Co.

LINDSAY Auto Parts Co., Meridian Life Bldg., Indianapolis, Ind.

MERCHANT & Evans Co., Philadelphia, Pa. "Evans." (See page 135.)

MUNCIE Gear Works, Muncie, Ind.

PERU Auto Parts Mfg. Co., Peru, Ind.

RUSSEL Motor Axle Co., Detroit, Mich. (See page 155.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y. (See page 363.)

BACKS

METAL SEAT BACKS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 333.)

BRISCOE Mfg. Co., Detroit, Mich.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

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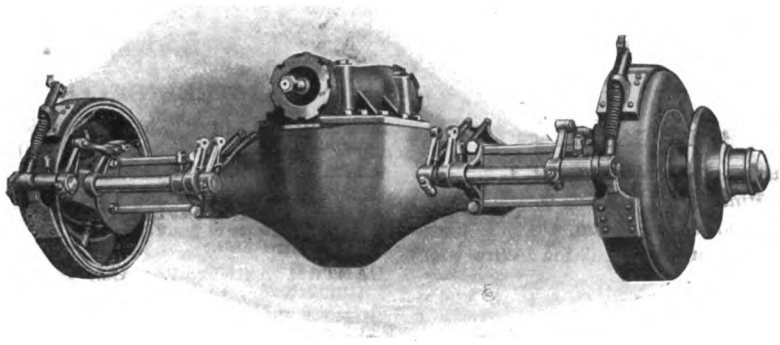
The Public Demands Them

SHELDON WORM DRIVE AXLES



ARE YOU prepared to meet the demand for WORM-DRIVEN TRUCKS? DO YOU realize the advance this type of axle is making? The single reduction, the great simplicity, and its adaptability to the needs of the user make it supreme.

SILENT and neat because all parts are enclosed in a sturdy cast steel housing. No chains and radius rods to rattle. All parts working in oil, insuring perfect quietness in operation.

SIMPLE because it is non-adjustable and positively fool-proof.

EFFICIENT because it's a direct drive, with a single reduction. Eliminates the loss of power in driving through a jack-shaft and chains. Conserves power because it has a sliding contact over a large surface, several teeth taking the strain instead of one tooth as in the bevel gears of the jack-shaft.

GET ready for this demand for the Worm Drive. Do it by getting a SHELDON EQUIPMENT—FRONT AXLES, REAR AXLES, and SPRINGS made of CARBON or ELECTRO-SILICA-MANGANESE STEEL.

SHELDON AXLE COMPANY
WILKES-BARRE, PA.

Chicago Branch
68 E. 12th Street

Detroit Branch
1215 Woodward Avenue

San Francisco Branch
444 Market Street

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BAGS

COAT RAIL BAGS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.

ARSENAL Varnish Co., Rock Island, Ill.

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

NATHAN Novelty Mfg. Co., 90 G. Reade St., New York, N. Y. (See page 671.)

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

WINSHIP, W. W., 71 Summer St., Boston, Mass.

RUBBER GAS BAGS

DAVOL Rubber Co., Providence, R. I.

DIAMOND Rubber Co., Akron, O.

GOODRICH Co., B. F., Akron, O.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

SEAMLESS Rubber Co., New Haven, Conn.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

TOOL BAGS OR ROLLS

(For Tool Boxes—See Boxes, Tool)

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

BROWN Co., H. S., 270 Kossuth St., Bridgeport, Conn.

CAMPBELL—See Perkins Campbell Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

DAFOE-EUSTICE Co., 54 Lafayette Blvd., Detroit, Mich. "Duk-Bak."

DUK-BAK—See Dafoe-Eustice Co.

ECONOMY Stay Co., Jefferson City, Mo.

EXCELSIOR Bag & Mfg. Co., Troy, N. Y.

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

HOPEWELL Bros., Newton, Mass. (See page 671.)

LANDERS Bros., Toledo, O. (See page 107.)

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O.

NATHAN Novelty Mfg. Co., 90 G. Reade St., New York, N. Y. (See page 671.)

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell." (See page 405.)

PLANET Co., Westfield, Mass.

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

SUPERIOR—See Feeser Co.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

BALLS

STEEL BALLS

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

ATLAS Ball Co., Glenwood Ave. & Second St., Philadelphia, Pa.

AUBURN Ball Bearing Co., 27 Elisabeth St., Rochester, N. Y. (See page 589.)

BANTAM Anti-Friction Co., Bantam, Conn. (Importers.) "H. & H."

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.) (See page 589.)

FRASSE & Co., Peter A., New York, N. Y. (Importers.) (See page 589.)

H. & H.—See Bantam Anti-Friction Co.

HOFFMAN—See R. I. V. Co.

HOOVER Steel Ball Co., Ann Arbor, Mich.

JONES Ball Co., Arlington Heights, Mass.

NEW Departure Mfg. Co., Bristol, Conn. (See pages 69 and 70.)

PRESSED Steel Mfg. Co., Land Title Bldg., Philadelphia, Pa.

R. I. V. Co., 254 W. 57th St., New York, N. Y. (Importers.) "Hoffman."

SMITH, Edwin, Spring City, Pa.

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

BANDING

BRAKE BANDING OR LINING

(For lining brakes or clutches—See also Leather, Friction; also Belting, Leather; also Fibre, Hard)

AMBESCO—See American Asbestos Co.

AMBLER AUTOBESTOS—See Keasbey & Mattison Co.

AMERICAN Asbestos Co., Norristown, Pa. "Ambesco." (See page 54.)

ARABIAN—See Rossendale-Reddaway Belting & Hose Co.

Complete Index to Classification appears on Pages 8 to 22.

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F. L. HORTON MFG. CO. BOSTON

ELEKTRA

ASBESTOS FRICTION

For BRAKES and CLUTCHES

Over 1,000,000 feet of material produced by our PATENTED PROCESS in daily use.

High co-efficient of friction gives greatest factor of safety in operation of all brakes and clutches and OUR PATENTED PROCESS produces the only HIGH-FRICTION facing.

THIS MATERIAL gives better satisfaction and wears longer than any other facing and is especially adapted for manufacturer's use; our BAND linings, as well as RINGS and CONES for CLUTCHES being formed ACCURATELY to shape and size.

F. L. HORTON MANUFACTURING CO

36 WHITTIER STREET, ROXBURY, MASS.

STAYBESTOS PRODUCTS

S-M-C ASBESTOS FAICTION FACINGS

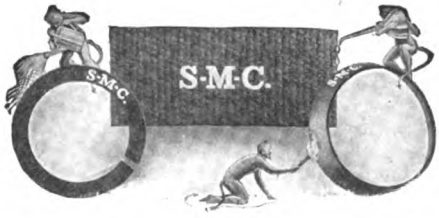
We are willing to let S-M-C ASBESTOS FRICTION FACINGS stand comparison with any other in the land on the basis of both quality and price. S-M-C is made from the highest quality asbestos and resistance wire compactly woven and scientifically treated. Absolutely fireproof and practically indestructible. Made in all shapes and sizes.

FORD SPECIAL NON-METALLIC BRAKE LINING

Our non-metallic brake lining for FORD CARS has eliminated all FORD transmission troubles.

Remember that we carry everything that you want that is made from asbestos. Write us.

STAYBESTOS MFG. COMPANY



Germantown, Phila., Pa.

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BANDING (Continued)

BRAKE BANDING OR LINING (Continued)

ASBESTOS & Rubber Works of America, 1790 Broadway, New York, N. Y. "Motobestos." (See page 663.)

ASBESTOS & Rubber Works of New Jersey, Camden, N. J. "Longwear." (See page opposite inside back cover.)

AXWELL Equipment Co., 421 Wood St., Pittsburg, Pa.

BESTBESTOS—See Federal Asbestos Co.

BLUE EDGE—See Woven Steel Hose & Rubber Co.

BRAIDOID—See Thermoid Rubber Co.

BURGMANN, Feodor, 5-9 Beekman St., New York, N. Y. (Importer.)

CAMEL HAIR — See Rossendale - Reddaway Belting & Hose Co.

CAREY Co., Philip (Lockland), Cincinnati, O. "Enduro."

CHESTERTON Co., A. W., 64 India St., Boston, Mass. "Gripbestos."

CORK Insert Co., 42 Batterymarch St., Boston, Mass.

DIAMOND N—See Norristown Magnesia & Asbestos Co.

DUCKWELL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind. "Durobestos."

DUROBESTOS—See Duckwall Belting & Hose Co.

EDKIN—See Germann Bronze Co.

ELEKTRA—See Horton Mfg. Co.

EMBESTOS—See Empire Rubber & Tire Co.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J. "Embestos."

ENDURO—See Carey Co.

ERBESTOS Brake Lining Co., 1430 Vine St., Philadelphia, Pa.

ESSEX Rubber Co., Trenton, N. J.

FEDERAL Asbestos Co., Van Houten St., Paterson, N. J. "Bestbestos," "Ford-Bestos."

FORD-BESTOS—See Federal Asbestos Co.

GANDY Belting Co., 728 W. Pratt St., Baltimore, Md.

GARCO—See General Asbestos & Rubber Co.

GENERAL Asbestos & Rubber Co., Charleston, S. C. "Garco." (See page 421.)

GERMANN Bronze Co., Erie, Pa. "Edkin."

GRIPBESTOS—See Chesterton Co.

GRIP-ON—See New York Leather Belting Co.

HORTON Mfg. Co., F. L., 36 Whittier St., Roxbury, Mass. "Elektra." (See page 61.)

J-M NON-BURN—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M Non-Burn."

KEASBEY & Mattison Co., Ambler, Pa. "Ambler Autobestos."

LONGWEAR—See Asbestos & Rubber Works of New Jersey.

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O.

MOTOBESTOS—See Asbestos & Rubber Works of America.

MULTIBESTOS—See Standard Woven Fabric Co.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y. "Grip-on."

NORRISTOWN Magnesia & Asbestos Co., Norristown, Pa. "Diamond N."

RAYBESTOS—See Royal Equipment Co.

ROSSENDALE—REDDAWAY Belting & Hose Co., Newark, N. J. "Camel Hair," "Arabian."

ROYAL Equipment Co., 1372 Bostwick Ave., Bridgeport, Conn. "Raybestos," "Stability." (See page 95.)

RUSSELL Mfg. Co., Middletown, Conn. "Rusco." (See page 663.)

S-M-C—See Staybestos Mfg. Co.

SALL Mountain Asbestos Mfg. Co., 230 S. LaSalle St., Chicago, Ill.

SCANDINAVIA Belting Co., 127-29 White St., New York, N. Y. (See page 505.)

STABILITY—See Royal Equipment Co.

STANDARD Brake Lining Co., Gleasondale, Mass.

STANDARD Woven Fabric Co., Framingham, Mass. "Multibestos." (See page 663.)

STAYBESTOS Mfg. Co. (Germantown), Philadelphia, Pa. "S-M-C." (See page 61.)

THERMOID Rubber Co., Trenton, N. J. "Braidoid." (See page 499.)

WOVEN Steel Hose & Rubber Co., Trenton, N. J. "Blue Edge." (See page 63.)

BANDS

NON-SKID BANDS

(See also Treads, Detachable. For Tire Chains—See Chains, Tire)

HERCULES—See Republic Rubber Tire & Shoe Co.

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth." (See page 663.)

PERFECTION Non-Skid Climber Co., Edon, O.

REPUBLIC Rubber Tire & Shoe Co., 152 W. 55th St., New York, N. Y. "Hercules."

WOODWORTH—See Leather Tire Goods Co.

BARS

ARCH BARS

(See Supports, Hood)

BASKETS

TOURING BASKETS

(See Hampers, Touring)

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BLUE EDGE
BEST BRAKE LINING
WOVEN STEEL HOSE & RUBBER CO.
TRENTON N.J.

Registered in the U. S. Patent Office.

"BLUE EDGE" BRAKE LINING
"BLUE EDGE" CLUTCH FACINGS
"BLUE EDGE" FRICTION RINGS

The name which we have been using for our well-known Brake Lining for the last five years has been so closely imitated by various other makers and dealers that we have adopted and trade-marked the name "BLUE EDGE" to indicate our highest grade of Brake Lining, and are painting this Brake Lining blue on the edges so that the user may know that he is getting real "BLUE EDGE," and not an imitation of it.

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BATTERIES

DRY BATTERIES

ACME RAPID FIRE—See Nungesser Carbon & Battery Co.

AMERICAN Carbon & Battery Co., Signal Hill, Ill.

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

AUTOCRAT—See Stackpole Carbon Co.

BLACK CAT—See Englewood Carbon Works.

BLUE RIBBON—See Roche Electrical Co.

BULL DOG—See Hi-Po Waterproof Battery Corp.

BULL DOG—See Western Dry Battery Co.

BUNNELL & Co., J. H., 20 Park Pl., New York, N. Y. "Jove."

BURN-BOSTON Battery & Mfg. Co., 8 Doane St., Boston, Mass.

COLUMBIA—See National Carbon Co.

DELTA Mfg. Co., Bloomfield, N. J.

EASTERN—See National Carbon Co.

ENGLEWOOD Carbon Works, State & 65th Sts., Chicago, Ill. "Black Cat," "Xcell."

EVER READY—See American Ever Ready Co.

FLEUR-DE-LIS—See French Battery & Carbon Co.

FRENCH Battery & Carbon Co., Madison, Wis. "Fleur-de-Lis."

GORDON Primary Battery Co., Waterbury, Conn.

HERCULES—See National Carbon Co.

HI-PO Waterproof Battery Co., 1007 Atlantic Ave., Brooklyn, N. Y. "Bull Dog."
(See page 65.)

HI-UP—See Manhattan Electrical Supply Co.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

JOVE—See Bunnell & Co.

MANHATTAN Electrical Supply Co., New York, N. Y. "Red Seal," "Hi-Up."
(See page 533.)

1900—See Nungesser Carbon & Battery Co.

NATIONAL Carbon Co., Cleveland, O. "Red Top," "Columbia," "Eastern," "Hercules," "Standby," "U. S."
(See page 65.)

NEW STANDARD—See Roche Electrical Co.

NUE—See Union Battery Co.

NUNGESSER Carbon & Battery Co., 1170 E. 38th St., Cleveland, O. "Acme Rapid Fire," "1900."

POWER—See Union Battery Co.

READYSPARK—See U. S. Auto Battery Co.

RED SEAL—See Manhattan Electrical Supply Co.

RED SHIELD—See Wesco Supply Co.

RED STAR—See White Star Battery Co.

RED TOP—See National Carbon Co.

ROCHE Electrical Co., Wm., 487 Greenwich St., New York, N. Y. "Yates-Roche," "New Standard," "Blue Ribbon."

ROCK Island Battery Co., Winton Pl., Cincinnati, O.

STACKPOLE Carbon Co., St. Marys, Pa. "Autocrat," "Wizard."
(See page 607.)

STANDARD Carbon Co., 1151-57 Stanford Ave., Los Angeles, Cal. "Western Ignitor."

STANDBY—See National Carbon Co.

TOPNOTCH—See U. S. Auto Battery Co.

UNION Battery Co., Belleville, N. J. "Nue." "Power."

U. S.—See National Carbon Co.

U. S. Auto Battery Co., 60-62 Warren St., New York, N. Y. "Readyspark," "Top-notch."

WASHINGTON Automobile Supply Co., Washington, Ill.
(See page 671.)

WESCO Supply Co., Seventh St. & Clark Ave., St. Louis, Mo. "Red Shield."

WESTERN—See Standard Carbon Co.

WESTERN Dry Battery Co., 2225-31 First Ave., S., Seattle, Wash. "Bull Dog."

WESTERN Electric Co., 463 West St., New York, N. Y.

WHITE Star Battery Co., 126 Chambers St., New York, N. Y. "Red Star."

WIZARD—See Stackpole Carbon Co.

XCELL—See Englewood Carbon Works.

YATES-ROCHE—See Roche Electrical Co.

STORAGE BATTERIES

A. B. Mfg. Co., Poughkeepsie, N. Y.

AJAX Battery Co., 1610 Michigan Ave., Chicago, Ill.
(See page 247.)

AMERICAN Battery Co., 1132-34 Fulton St., Chicago, Ill. "Invincible."

AMERICAN Storage Battery Co., Cambridge, Mass. "Harvard."

AMPVO Battery Co., 1607 Michigan Ave., Chicago, Ill. "Economy."

APELCO—See Apple Electric Co.

APPLE Electric Co., 16 Canal St., Dayton, O. "Apelco."
(See page 159.)

ASHBROOK, J. F., 2639 Emmet St., Chicago, Ill. "Square," "Satisfaction."

BALTIMORE Electric Storage Battery Co., Bayard & Severn Sts., Baltimore, Md.
(See page 247.)

BISON Storage Battery Co., 38 Riley St., Buffalo, N. Y.

BROWN-SMITH Battery Co., Bloomington, Ind.

COMBAT—See Commercial Battery Co.

COMMERCIAL Battery Co., 2106-10 Michigan Ave., Chicago, Ill. "Combat."

CONSUMERS Battery Co., 1312 S. Wabash Ave., Chicago, Ill. "Sky-Hy."
(See page 65.)

COOK Railway Signal Co., Gas & Electric Bldg., Denver, Colo. "Re Vivo."

COSMOS Electric Co., 136 Liberty St., New York, N. Y.

ECONOMY—See Ampvo Battery Co.

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BATTERIES (Continued)

STORAGE BATTERIES (Continued)

EDISON Storage Battery Co., 131 Lakeside Ave., Orange, N. J.
(See page 67.)

ELECTRIC Storage Battery Co., Allegheny Ave. & 19th St., Philadelphia, Pa. "Exide."

ELECTRIC Storage Battery & Mfg. Co., Cincinnati, O. "Hydrox."

ELECTRIC Supply & Battery Co., 7510 Woodland Ave., S. E., Cleveland, O.

ESSEX Storage Battery & Supply Co., 272 Halsey St., Newark, N. J.

EXIDE—See Electric Storage Battery Co.

FERMOILE-JOHNSON Storage Battery Co., 445 Third St., Niagara Falls, N. Y.
(See page 587.)

FIRE FLY—See Hoosier Storage Battery Co.

FORSE Electric Co., The Speedway, Indianapolis, Ind.

GEISZLER Bros. Storage Battery Co., 1512-20 W. 57th St., New York, N. Y. "Midget."
(See page 525.)

GENERAL Storage Battery Co., 2005 Locust St., St. Louis, Mo.

GOULD Storage Battery Co., 30 E. 42d St., New York, N. Y.
(See page 415.)

HARVARD—See American Storage Battery Co.

HEISSLER Storage Battery Co., 1425 Michigan Blvd., Chicago, Ill.

HELIOS—See National Carbon Co.

HIRSCH Electric Mine Lamp Co., 221-27 N. 23d St., Philadelphia, Pa.

HOBO—See Hoosier Storage Battery Co.

HOOSIER Storage Battery Co., 214 E. Penn. St., Evansville, Ind. "Fire Fly," "Hobo."
(See page 415.)

HUDSON-FULTON—See Storage Battery Supply Co.

HYDROX—See Electric Storage Battery & Mfg. Co.

INVINCIBLE—See American Battery Co.

JEWEL Electric Co., 1467-69 Michigan Ave., Chicago, Ill.

KEELER Battery Co., 134 Ontario St., Toledo, O.

KOENER Guaranteed Battery Co., 2325 Wabash Ave., Chicago, Ill.

KREMLO—See McCauley Storage Battery Co.

LBA—See Willard Storage Battery Co.

L-C-R Storage Battery Co., 33 S. St. Clair St., Dayton, O.

LAWRENCE Storage Battery Co., Cleveland, O.

McCAULEY Storage Battery Co., 1060 St. Clair Ave., E., Cleveland, O. "Kremlo."

MARKO & Co., Paul M., 1191 Bedford Ave., Brooklyn, N. Y.
(See page 415.)

MIDGET—See Geiszler Bros. Storage Battery Co.

MULLER Storage Battery Co., 212 Michigan St., Toledo, O.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium."
(See page 507.)

MOTOR Car Supply Co., 1451-53 Michigan Ave., Chicago, Ill. "Unxld."

MOUND City Battery Co., 17 S. Boyle St., St. Louis, Mo.

MULLER, Albert, Hoffman Blvd. & Hillside Ave., Jamaica, N. Y. "Porox."

MULTIPLE Storage Battery Co., 427 W. 50th St., New York, N. Y.

NATIONAL Carbon Co., Cleveland, O. "Helios."
(See page 65.)

NORTHWESTERN Storage Battery Co., Milwaukee, Wis.
(See page 595.)

PERFECTION Igniter Mfg. Co., 1175 Bedford Ave., Brooklyn, N. Y.

PERFECTION Storage Battery Co., 2023-25 S. Michigan Ave., Chicago, Ill.

PHILADELPHIA Storage Battery Co., Ontario & C Sts., Philadelphia, Pa.
(See page 595.)

POROX—See Muller, Albert.

PUMPELLY Battery Co., 533-35 N. Capital Ave., Indianapolis, Ind.

Q. C. Battery Co., 27 Quincy St., Brooklyn, N. Y.

RADIUM—See Milwaukee Auto Specialty Co.

RE VIVO—See Cook Railway Signal Co.

RELIABLE—See Storage Battery Supply Co.

RELIANCE—See Storage Battery Supply Co.

REX Battery Co., 1718-20 Wabash Ave., Chicago, Ill.

SATISFACTION—See Ashbrook, J. F.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SILVEY Electric Co., 10-16 S. Canal St., Dayton, O.

SKY-HY—See Consumers Battery Co.

SQUARE—See Ashbrook, J. F.

STORAGE Battery Supply Co., 239 E. 27th St., New York, N. Y. "Reliance," "Reliable," "Hudson-Fulton."

U-S-L—See U. S. Light & Heating Co.

U. S. Light & Heating Co., 50 Church St., New York, N. Y. "U-S-L."
(See page 173.)

UNIVERSAL Battery Co., 301-09 N. Peoria St., Chicago, Ill.

UNXLD—See Motor Car Supply Co.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

VIVAX Storage Battery Co., 2228 Michigan Ave., Chicago, Ill.

VOLKCAR Storage Battery Co., 2441 Michigan Ave., Chicago, Ill.

WILLARD Storage Battery Co., Cleveland, O. "Lba."
(See page 553.)

WITHERBEE Igniter Co., Springfield, Mass.

ZOAR Battery Co., Zoar, O.

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BALL BEARINGS

(For Bearing Parts—See Balls, Steel; also Cups, Ball also Retainers, Ball)

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

AUBURN Ball Bearing Co., 27 Elizabeth St., Rochester, N. Y.
(See page 589.)

B. K. F.—See Lehman Mfg. Co.

BALL & Roller Bearing Co., Danbury, Conn.
(See page 71.)

BANTAM Anti-Friction Co., Bantam, Conn.

BARTHEL & Daly, 42 Broadway, New York, N. Y. (Importers.) "Schafer."
(See page 145.)

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.) "F & S"
(See page 589.)

D. W. F.—See Hess-Bright Mfg. Co.

F & S—See Bretz Co.

FAFNIR—See Rhineland Machine Works Co.

G-A—See German-American Ball Bearing Mfg. Co.

GERMAN-AMERICAN Ball Bearing Mfg. Co., 342-44 N. Sheldon St., Chicago, Ill. "G A."
(See page 469.)

GURNEY Ball Bearing Co., Jamestown, N. Y.
(See page 423.)

H-B—See Hess-Bright Mfg. Co.

H. C. B.—See Schaefers, Jos.

HESS-BRIGHT Mfg. Co., Front St. & Erie Ave., Philadelphia, Pa. "H-B," "D. W. F."
(See Front Cover.)

IMPERIAL Bearing Co., Detroit, Mich.
(See page 537.)

LEHMAN Mfg. Co., J. H., 727 Seventh Ave., New York, N. Y. (Importers.) "B. K. F."

MARBURG Bros., 1790 Broadway, New York, N. Y. (Importers.) "S. R. O."
(See page 589.)

NEW Departure Mfg. Co., Bristol, Conn.
(See pages 69 and 70.)

NORMA Co. of America, 20-22 Vesey St., New York, N. Y. (Importers.)

OLIN, Giberson & Lowly, 1790 Broadway, New York, N. Y. (Importers.) "Riebe."

R. B. F.—See Rhineland Machine Works Co.

R. I. V. Co., 254 W. 57th St., New York, N. Y. (Importers.)

RHINELAND Machine Works Co., 140 W. 42d St., New York, N. Y. (Importers.) "R. B. F.," "Fafnir."
(See inside front cover.)

RIEBE—See Olin, Giberson & Lowly.

S.K.F. Ball Bearing Co., 50 Church St., New York, N. Y. (Importers.)

S.R.O.—See Marburg Bros.

SCHAEFERS, Jos., Cleveland, O. (Importer.) "H. C. B."

SCHAFER—See Barthel & Daly.

STANDARD Machinery Co., 7 Beverley St., Providence, R. I.
(See page 469.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

STAR Ball Retainer Co., Lancaster, Pa.
(See page 357.)

SUSPENSION Roller Bearing Co., Sandusky, O.

U. S. Ball Bearing Mfg. Co., Harrison Ave., Oak Park, Ill.
(See page 85.)

ROLLER BEARINGS

AMERICAN Roller Bearing Co., 614 Farmers Bank Bldg., Pittsburg, Pa.
(See page 151.)

BALL & Roller Bearing Co., Danbury, Conn.
(See page 71.)

BANTAM Anti-Friction Co., Bantam, Conn.

BOCK Bearing Co., Phillips Ave. & Michigan Central R. R., Toledo, O.

BOWER Roller Bearing Co., Detroit, Mich.
(See page 87.)

HYATT Roller Bearing Co., Detroit, Mich.
(See page 323.)

JACER—See Reber, James C.

MAKUTCHAN Roller Bearing Co., McCormick Bldg., Chicago, Ill.

NORMA Co. of America, 20-22 Vesey St., New York, N. Y. (Importers.)

RAILWAY Roller Bearing Co., 541 Seymour St., Syracuse, N. Y.

REBER, James C., Reading, Pa. "Jacer."

STANDARD Machinery Co., 7 Beverly St., Providence, R. I.
(See page 469.)

STANDARD Roller Bearing Co., 50th St. & Lancaster Ave., Philadelphia, Pa.

SUSPENSION Roller Bearing Co., Sandusky, O.

TIMKEN Roller Bearing Co., Canton, O.

REGRINDING OF BALL BEARINGS

AHLBERG Bearing Co., 2644 Michigan Ave., Chicago, Ill.
(See page 77.)

GWILLIAM Co., Broadway & 58th St., New York, N. Y.

PRUYN Ball Bearing Works, Philadelphia, Pa.

PRUYN & Bilodeau, 1551 River St., Hyde Park, Mass.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J.

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(For warning signal in place of horn on electric cars)

COLONIAL Bell Sales Co., Cuyahoga Bldg., Cleveland, O.

DELTA-STAR Electric Co., 617-31 W. Jackson Blvd., Chicago, Ill.

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Syracuse Rubber Co., 212 S. Clinton St., Syracuse, N. Y.
Iroquois Rubber Co., 279-283 Washington St., Buffalo, N. Y.
Rochester Rubber Co., 24 Exchange St., Rochester, N. Y.
The Gwilliam Co., 1314 Arch St., Philadelphia, Pa.
Ahlberg Bearing Co., 2637 Michigan Ave., Chicago, Ill.
Chicago Pulley & Shafting Co., 32-36 S. Clinton St., Chicago, Ill.
Faeth Iron Co., 1125-31 West Eighth St., Kansas City, Mo.
Fred Campbell, 1127 Olive St., St. Louis, Mo.
Pence Automobile Co., 800 Hennepin Ave., Minneapolis, Minn.
The Lininger Implement Co., Fifth & Pacific Sts., Omaha, Neb.
Denver Auto Goods Co., 1600 Broadway, Denver, Colo.
Fry & McGill, 16th & Broadway, Denver, Colo.
M. L. Foss, 1729 California St., Denver, Colo.
Bertram Motor Supply Co., 251 South State St., Salt Lake City, Utah.
Salt Lake Hdwe. Co., Salt Lake City, Utah.
J. W. Leavitt & Co., 301 Golden Gate Ave., San Francisco, Cal.
Irvin Silverberg & Co., 541 Van Ness Ave., San Francisco, Cal.
Kimball-Upson Co., 609-11 K St., 608-15 Oak Ave., Sacramento, Cal.
Pacific Ball Bearing Co., 1516 West Pico St., Los Angeles, Cal.
Western Rubber & Supply Co., 1011 S. Olive St., Los Angeles, Cal.
Ballou & Wright, Seventh & Oak Sts., Portland, Ore.
Ballou & Wright, 817 E. Pike St., Seattle, Wash.
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ELECTRIC BELLS (Continued)

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LIBERTY Bell Co., 346 The Arcade, Cleveland, O.

MANHATTAN Electrical Supply Co., New York, N. Y.
(See page 533.)

P R Mfg. Co., 621 Bellevue Ave., Detroit, Mich.

RECTI—See Edwards & Co.

ROUSSEAU, David, Ossining, N. Y.

WESTERN Electric Co., 463 West St., New York, N. Y.

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BEVIN Bros. Mfg. Co., East Hampton, Conn.

EAST Hampton Bell Co., East Hampton, Conn.

MOSSBERG Co., Frank, Attleboro, Mass.
(See page 557.)

NEW Departure Mfg. Co., Bristol, Conn.
(See pages 69 and 70.)

BELTING

LEATHER BELTING

(See also Belts)

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass.

AQUA—See Shultz Belting Co.

BONNER & Barnewell, 30 Church St., New York, N. Y.

BRADFORD Belting Co., 201 Walnut St., Cincinnati, O. "Monarch."

CHIBECO—See Chicago Belting Co.

CHICAGO Belting Co., 113-25 N. Green St., Chicago, Ill. "Chibeco."

COCHECO—See Williams & Sons.

COMBER—See Rahmann & Co.

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa. "Vim."

HUDSON Belting Co., 1-3 Eaton Pl., Worcester, Mass.

JEWELL Belting Co., 55 Trumbull St., Hartford, Conn.

LADEW, Est. of Edward R., 82-84 Fulton St., New York, N. Y.

MONARCH—See Bradford Belting Co.

NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich.
(See page 77.)

NEW YORK Leather Belting Co., 51 Beekman St., New York, N. Y.

NORWICH Belt Mfg. Co., Norwich, Conn.

PAGE Belting Co., Concord, N. H.

RAHMANN & Co., Geo., 21 Spruce St., New York, N. Y. "Comber."

RHOADS & Sons, J. E., 12 N. Third St., Philadelphia, Pa. "Tannate."

SCHIEREN Co., Chas. A., New York, N. Y.

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo. "Aqua."

TANNATE—See Rhoads & Sons.

TAYLOR Belting Co., 247 S. Meridian St., Indianapolis, Ind.

VIM—See Houghton & Co.

WEATHERHEAD-THOMPSON Co., Pawtucket, R. I.

WILLIAMS & Sons, I. B., Dover, N. H. "Cocheco."

BELTS

ENDLESS COTTON BELTS

BROPHY Belting & Supply Co., Hinsdale, Ill.

GILMER Co., L. H., 52 N. Seventh St., Philadelphia, Pa.
(See page 73.)

HINSON Co., C. & B., Grove & Liddell Sts., Cincinnati, O. "Seeandbee."

SEEANDBEE—See Hinson Co.

SPIRAL WIRE BELTS

BIDDISON Mfg. Co., 1516 Williamson St., Madison, Wis. "True Blue."

BULL DOG—See N. Y. Wire & Spring Co.

CALCUTTS—See Gardner Wire Co.

EUREKA Spring Co., 347 W. Broadway, New York, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 221.)

GARDNER Wire Co., 5642-46 Ohio St. (Austin Station), Chicago, Ill. "Calcutts."

HEBB, Geo. A., 70 William St., Newark, N. J.

KELLEY, A. F., 178 S. Main St., Providence, R. I. "Kello."

KELLO—See Kelley, A. F.

MORGAN Spring Co., Worcester, Mass.

N. Y. Wire & Spring Co., 586-88 Washington St., New York, N. Y. "Bull Dog."
(See page 385.)

TRUE BLUE—See Biddison Mfg. Co.

WEBB Mfg. Co., ft. Center St., Newark, N. J.
(See page 527.)

V BELTS

(For Flat Belts—See Belting, Leather)

ALGCO—See Auburn Leather Goods Co.

AUBURN Leather Goods Co., Auburn, N. Y. "Algco."

CHIBECO—See Chicago Belting Co.

CHICAGO Belting Co., 113-25 N. Green St., Chicago, Ill. "Chibeco."

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

COE & Brown, 202-04 George St., New Haven, Conn.

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BELTS (Continued)

V BELTS (Continued)

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich. "Flexo." (See page 83.)

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

FLEXO—See Detroit Leather Works.

GRATON & Knight Mfg. Co., Worcester, Mass. "Spartan." (See page 75.)

HIDE, Leather & Belting Co., Indianapolis, Ind. "Wetprufe." (See page 251.)

KONTAK—See Rahmann & Co.

MONOGRAM—See National Leather Mfg. Co.

NATIONAL Leather Belting Co., 312 E. 38th St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich. "Monogram." (See page 77.)

PAGE Belting Co., Concord, N. H.

PEERLESS-V-BELT Co., Cedar Rapids, Ia.

RAHMANN & CO., Geo., 31 Spruce St., New York, N. Y. "Kontak."

RHOADS & Sons, J. E., 12 N. Third St., Philadelphia, Pa.

SCHIEREN Co., Chas. A., New York, N. Y.

SPARTAN—See Graton & Knight Mfg. Co.

WETPRUFE—See Hide, Leather & Belting Co.

BENDINGS

WOOD BENDINGS

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J. (See page 83.)

CAMPBELL & Dann Mfg. Co., Tullahoma, Tenn.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

SHEPARD & Sons, H. G., James & River Sts., New Haven, Conn.

TOLEDO Bending Co., Toledo, O.

TUCKER Wood Work Co., Sidney, O.

WHEEL & Wood Bending Co., 141 John St. Bridgeport, Conn.

BINDING

MAT AND CARPET BINDING

DOUGLAS & Lomason Co., Detroit, Mich.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

LANDERS Bros. Co., Toledo, O. (See page 107.)

BINDINGS

UPHOLSTERY BINDINGS

BACKSTAY Machine & Leather Co., Union City, Ind.

BOULEVARD—See Woodward & Cochey.

CASEY Mfg. Co., Detroit, Mich.

CINCINNATI Welt Co., 118 Opera Pl., Cincinnati, O.

LANDERS Bros. Co., Toledo, O. (See page 107.)

WADE Mfg. Co., Brockton, Mass. (See page 543.)

WOODWARD & Cochey, 106 Sea St. Blvd., Lynn, Mass. "Boulevard."

BLANKS

GEAR BLANKS

(See Gears, Blank)

BOARDS

RUNNING BOARDS

(See Steps, Special)

BODIES

METAL COMMERCIAL CAR BODIES

ACME Body Co., Rahway, N. J.

ALBERT Bros., 11-13 Cannon St., New York, N. Y

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

AUTO Body Co., Lansing, Mich. (See page 83.)

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Specialty Mfg. Co., 326-30 E. Market St., Indianapolis, Ind.

BAILY & Co., S. E., 430 N. Queen St., Lancaster, Pa.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BRILL Co., J. G., 62d St. & Woodland Ave., Philadelphia, Pa.

BROWN Auto-Carriage Co., 3147 Superior Ave., Cleveland, O.

BUDD Mfg. Co., Edward G., Aramingo & Tioga Sts., Philadelphia, Pa.

CENTRAL Mfg. Co., 18th St. & Georgia Ave., Connersville, Ind.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

Complete Index to Classification appears on Pages 8 to 22.

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BODIES (Continued)

METAL COMMERCIAL CAR BODIES (Continued)

COLYER & Co., J., 500 Central Ave., Newark, N. J.

COMMERCIAL Auto Body & Mfg. Co., 5345 St. Clair Ave., Cleveland, O.

COOLING Carriage Co., 402 French St., Wilmington, Del.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

DETROIT Body Co., Kercheval & Beaufait Aves., Detroit, Mich.

EUREKA—See Lally Commercial Body Co.

FINNESY & Kobler, 26th & Parrish Sts., Philadelphia, Pa.

HALE & Kilburn Co., 18th St. & Lehigh Ave., Philadelphia, Pa.

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich.
(See pages 78 and 79.)

HERBERT Mfg. Co., 570 Kirby Ave., W., Detroit, Mich.

HIGHLAND Body Mfg. Co. (Elmwood Place), Cincinnati, O.
(See page 81.)

HUTCHCROFT & Sons Co., D. G., Cleveland, O.

IMPERIAL—See Welch & Suthergreen.

K-L—See Kingsbury-Leahy Co.

KAHLER Co., N. Vincennes St. & Monon R.R., New Albany, Ind.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa.
(See page 81.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y. "K-L."
(See page 81.)

LALLY Commercial Body Co., 21 W. First St. (S. Boston), Boston, Mass. "Perfection," "Eureka," "Paragon."

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LEITCH Co., James N., Amesbury, Mass.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MIFFLINBURG Body & Gear Co., Mifflinburg, Pa.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

NEW Haven Carriage Co., New Haven, Conn.
(See page 83.)

PARAGON—See Lally Commercial Body Co.

PEERLESS Top & Supply Co., 411-13 W. 55th St., New York, N. Y.

PERFECTION—See Lally Commercial Body Co.

PORTLAND Body Works, Portland, Ind.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind.
(See page 81.)

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SHOWALTER Mfg. Co., 314-16 N. Hanson Ave., Indianapolis, Ind.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 140.)

STEWART Co., W. F., Harriet St., Flint, Mich.

TROY Mfg. Co., Troy, O.

WALKER-WELLS Co., Amesbury, Mass.

WELCH & Suthergreen, 80 Lunenburg St., Fitchburg, Mass. "Imperial."

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

WERNER & Sons, Geo., 133-37 Main St., Waupun, Wis.

METAL PLEASURE CAR BODIES

ABRESCH Co., Chas., Fourth & Poplar Sts., Milwaukee, Wis.

ACME Body Co., Rahway, N. J.

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

ARMSTRONG Co., M., 433 Chapel St., New Haven, Conn.

AUTO Body Co., Lansing, Mich.
(See page 83.)

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Specialty Mfg. Co., 326-30 E. Market St., Indianapolis, Ind.

BAILY & Co., S. E., 430 N. Queen St., Lancaster, Pa.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BEAUDETTE Co., O. J., Pontiac, Mich.

BIDDLE & Smart Co., Amesbury, Mass.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BLUE Ribbon Auto & Carriage Co., 1720 Fairfield Ave., Bridgeport, Conn.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BREWSTER & Co., Queensboro Bridge Plaza, Long Island City, N. Y.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BRIGGS Mfg. Co., Clay Ave., Detroit, Mich.

BRILL Co., J. G., 62d St. & Woodland Ave., Philadelphia, Pa.

BRUNN'S Carriage Mfg. Co., 1140-48 Main St., Buffalo, N. Y.

BRUNN & Co., 980 Ellicott St., Buffalo, N. Y.

BUDD Mfg. Co., Edward G., Aramingo & Tioga Sts., Philadelphia, Pa.

BURR & Co., 205 W. 75th St., New York, N. Y.

CAPITOL Body Co., Ray St. & Madison Ave., Indianapolis, Ind.

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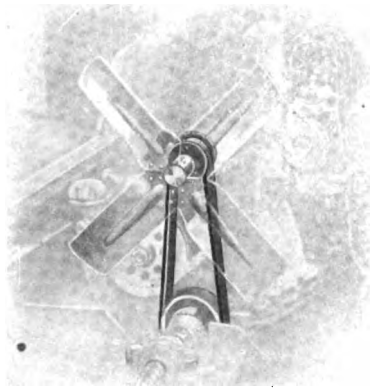

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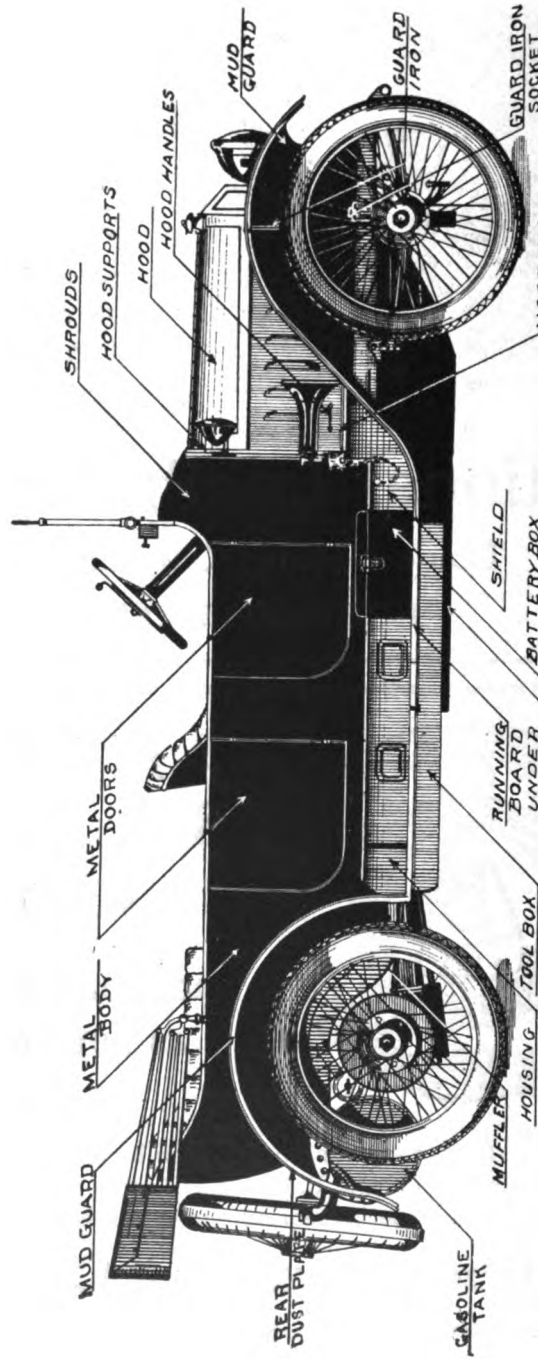

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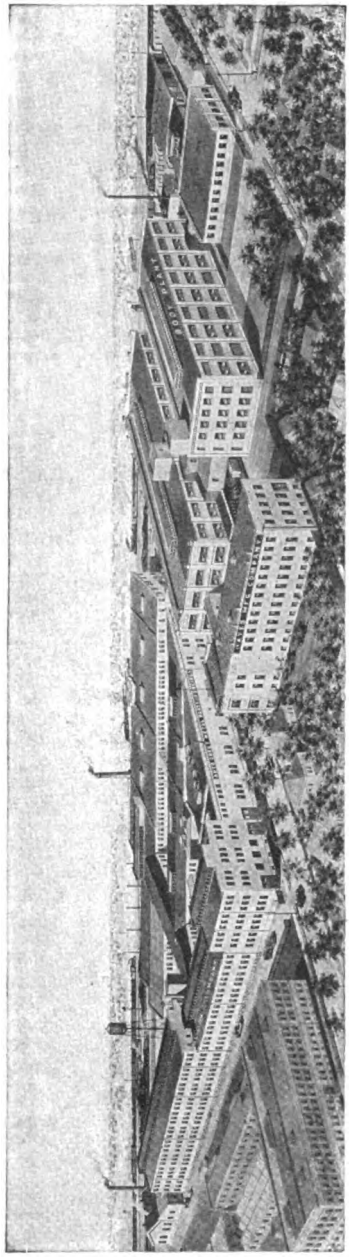

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METAL PLEASURE CAR BODIES (Continued)

CARRIAGE Woodstock Co., Owensboro, Ky.

CENTRAL Mfg. Co., 18th St. & Georgia Ave., Connersville, Ind.

CLARK Carriage Co., Amesbury, Mass.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 500 Central Ave., Newark, N. J.

CONVERTIBLE Automobile Body Corp., Longacre Bldg., New York, N. Y. (See page opposite Title Page.)

COOLING Carriage Co., 402 French St., Wilmington, Del.

CUNNINGHAM Son & Co., James, 18 Canal St., Rochester, N. Y.

CURRIER-CAMERON Co., Amesbury, Mass.

CUTTER, J. Frank, 30 Amherst St., Cambridge, Mass.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

DEMAREST & Co., A. T., New Haven, Conn.

DETROIT Body Co., Kercheval & Beaufait Aves., Detroit, Mich.

DUNHAM & Son., D B., Central Ave. & Fourth St., Newark, N. J.

FARNHAM & Nelson Co., 47 Union Ave., Boston, Mass.

FISHER Body Co., St. Antoine St. & M. C. R. R., Detroit, Mich

FITZ GIBBON & Crisp, Trenton, N. J.

FLANDRAU & Co., 205 W. 75th St., New York, N. Y.

FLEETWOOD Metal Body Co., Fleetwood, Pa.

GRISWOLD Motor & Body Co., 660 Commonwealth Ave., Detroit, Mich.

HASSETT & Rogers, Oak St., Amesbury, Mass.

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich. (See pages 78 and 79.)

HEALEY & Co., Broadway & 51st St., New York, N. Y.

HERBERT Mfg. Co., 570 Kirby Ave., W., Detroit, Mich.

HOLBROOK Co., West End Ave. & 67th St., New York N. Y.

HOLLANDER & Morrill, Amesbury, Mass.

IRVIN Mfg. Co., R. J., Morris & Division Sts., Indianapolis, Ind.

JUDKINS Co., J. B., Merrimac, Mass.

KAHLER Co., N. Vincennes St. & Monon R. R., New Albany, Ind.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa. (See page 81.)

KIMBALL & Co., C. P., Chicago, Ill. (See page 97.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y. (See page 81.)

KLINGER, Louis, 745 E. 11th St., New York, N. Y.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LEITCH Co., James N., Amesbury, Mass.

LOCKE & Co., 218-20 W. 34th St., New York, N. Y.

MAC INNIS Bros., 118-22 22d St., Toledo, O.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MIFFLINSBURG Body & Gear Co., Mifflinburg, Pa.

MILLER Bros., Chestnut St., Amesbury, Mass.

MONROE Body Co., Osmun St., Pontiac, Mich.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

NEW HAVEN Carriage Co., New Haven, Conn. (See page 83.)

PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

PORTLAND Body Works, Portland, Ind.

PULLAR Co., James, 5 Mechanic St., Hartford, Conn.

QUINBY & Co., J. M., 21-39 Division St., Newark, N. J.

RACINE Mfg. Co., Sixth & Meade Sts., Racine, Wis.

REID Co., 1603 Second Ave., Moline, Ill.

RICKARDS & McLaughlin Wagon Co., Trenton, N. J.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind. (See page 81.)

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SEAMAN Co., W. S., 486 Virginia St., Milwaukee, Wis.

SHOWALTER Mfg. Co., 314-16 Hanson Ave., Indianapolis, Ind.

SOUTH Bend Auto Body Co., South Bend, Ind.

SPRINGFIELD Metal Body Co., Springfield, Mass. (See page 140.)

STEWART Co., W. F., Harriet St., Flint, Mich.

THOMPSON Co., E. J. (Forbes Field), Pittsburg, Pa.

TROY Mfg. Co., Troy, O.

UNION CITY Body Co., Union City, Ind.

WALKER Carriage Co., Merrimac, Mass. (See page 665.)

WALKER-WELLS Co., Amesbury, Mass.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WILSON Body Co., C. R. (Milwaukee Junction), Detroit, Mich.

WOOP, Wm., 42-50 W. 67th St., New York, N. Y.

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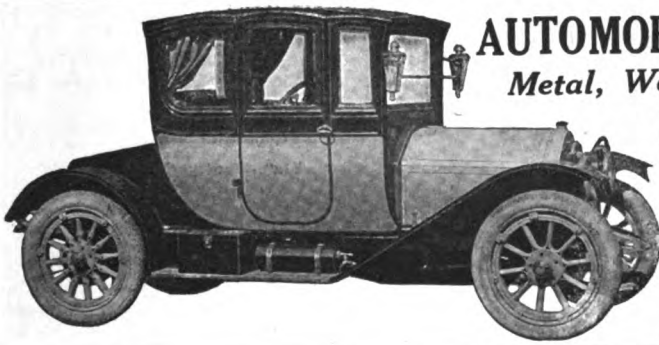

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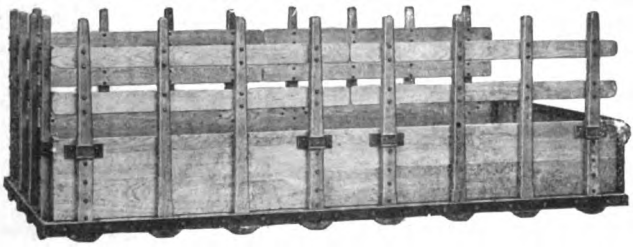

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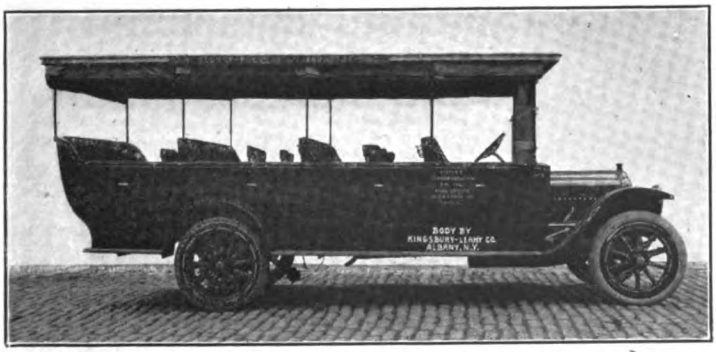

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WRIGHT Co., Thomas, 71-73 Golden St., Jersey City, N. J.

YORK Wagon Gear Co., York, Pa.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa.

ZIMMERMAN & Sons, F. F., Main St., Waupun, Wis.

WOOD COMMERCIAL CAR BODIES

ACME Body Co., Rahway, N. J.

ALBERT Bros., 11-13 Cannon St., New York, N. Y.

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

AUBURN Wheel & Mfg. Co., Auburn, R. I.

AUTO Body Co., Lansing, Mich. (See page 83.)

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Specialty Mfg. Co., 326-30 E. Market St., Indianapolis, Ind.

BAILEY & Bowne, Whitesboro & Wiley Sts., Utica, N. Y.

BAILY & Co., S. E., 430 N. Queen St., Lancaster, Pa.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BOLLWERK & Bro., H., 3103 S. Broadway, St. Louis, Mo.

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BRILL Co., J. G., 62d St. & Woodland Ave., Philadelphia, Pa.

BROWN Auto-Carriage Co., 3147 Superior Ave., Cleveland, O.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

CHICAGO Carriage & Trimming Co., 1908 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 500 Central Ave., Newark, N. J.

COMMERCIAL Auto Body & Mfg. Co., 5345 St. Clair Ave., Cleveland, O.

COOLING Carriage Co., 402 French St., Wilmington, Del.

COPE Co., 1082-84 Clinton Ave., Irvington, N. J.

CURRIER-CAMERON Co., 35 Elm St., Amesbury, Mass.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

DETROIT Body Co., Kercheval & Beaufait Aves., Detroit, Mich.

DUNHAM & Son, D. B., Central Ave. & Fourth St., Newark, N. J.

EUREKA—See Lally Commercial Body Co.

FINNESY & Kobler, 26th & Parrish Sts., Philadelphia, Pa.

FISHER, A., 300-10 Fort St., W., Detroit, Mich.

GOOLD Co., James, Broadway & Schuyler St., Albany, N. Y.

HASSETT & Rogers, Oak St., Amesbury, Mass.

HERBERT Mfg. Co., 570 Kirby Ave., W., Detroit, Mich.

HIGHLAND Body Mfg. Co. (Elmwood Place), Cincinnati, O. (See page 81.)

HOOVER Wagon Co., York, Pa. "Eureka," "Paragon."

IMPERIAL—See Welch & Suthergreen.

IRVIN Mfg. Co., R. J., Morris & Division Sts., Indianapolis, Ind.

JEWETT-GAMAGE Co., 172-74 Shrewsbury St., Worcester, Mass.

K-L—See Kingsbury-Leahy Co.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa. (See page 81.)

KIDNEY Co., James, Cincinnati, O.

KINGSBURY-LEAHY Co., 131-33 Hudson Ave, Albany, N. Y. "K-L." (See page 81.)

KOENIG & Luhrs Wagon Co., Quincy, Ill.

LALLY Commercial Body Co., 21 W. First St. (S. Boston), Boston, Mass. "Perfection," "Eureka," "Paragon."

LANGE Wagon Co., H., S. St. Clair & Eva Sts., E. E., Pittsburg, Pa.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LOWELL Auto Body Co., Lowell Mich.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MEDIA Carriage Mfg. Co., Media, Pa.

METROPOLITAN Auto & Carriage Co., 430-34 Grand St., Bridgeport, Conn.

MIFFLINBURG Body & Gear Co., Mifflinburg, Pa.

MILBURN Wagon Co., Toledo, O.

MILLER Co., E. M., Quincy, Ill.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOTOR Truck Body Co., 320 Franklin St., Detroit, Mich.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MULHOLLAND Co., Washington Ave., Dunkirk, N. Y.

NEW Haven Carriage Co., New Haven, Conn. (See page 83.)

NIEDERHUT Carriage Co., 3556-62 Walnut St., Denver, Colo.

PARAGON—See Lally Commercial Body Co.

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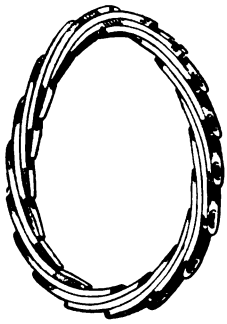

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WOOD COMMERCIAL CAR BODIES (Continued)

PEERLESS Top & Supply Co., 411-13 W. 55th St., New York, N. Y.

PERFECTION—See Lally Commercial Body Co.

PETERS Wagon & Auto Works, Ensor & East Sts., Baltimore, Md.

RECH-MARBAKER Co., Eighth St. & Girard Ave., Philadelphia, Pa.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind. (See page 81.)

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHAEFER Wagon Co., Gustav, 4170-80 Lorain Ave., Cleveland, O.

SCHILDWACHTER Carriage Co., Park Ave & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SEBASTIAN Wagon Co., 425 E. 53d St., New York, N. Y.

SHADBOLT Mfg. Co., Flushing Ave. & Cumberland St., Brooklyn, N. Y.

SHOWALTER Mfg. Co., 314-16 N. Hanson Ave., Indianapolis, Ind.

SJOBERG Co., J. P., 70th St. & Ave. A., New York, N. Y.

STURTEVANT-LARRABEE Co., Binghamton, N. Y.

TEGETMEIER & Riepe Co., 771-73 First Ave. New York, N. Y.

TROY Mfg. Co., Troy, O.

UHLENHAUT Bros. Wagon Co., 1322-24 Merchant St., St. Louis, Mo.

UNION Wheel Works, 51-55 Stanton St., Newark, N. J.

VALENTINE, J. S., 432-38 Princeton Ave. Trenton, N. J.

WAVERLEY Co., 139 S. East St., Indianapolis. Ind.

WEBER Co., M., 218-20 N. St. Clair St., Dayton, O.

WELCH & Suthergreen, 80 Lunenburg St. Fitchburg, Mass. "Imperial."

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

WRIGHT Co., Thos., 71-73 Golden St., Jersey City, N. J.

YORK Wagon Gear Co., York, Pa.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa.

ZIMMERMAN & Sons, F. F. Main St., Waupun, Wis.

WOOD PLEASURE CAR BODIES

ABRESCH Co., Chas., Fourth & Poplar Sts., Milwaukee, Wis.

ACME Body Co., Rahway, N. J.

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

ARMSTRONG Co., M., 438 Chapel St., New Haven, Conn.

AUTO Body Co., Lansing, Mich. (See page 83.)

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AUTO Specialty Mfg. Co., 326-30 E. Market St., Indianapolis, Ind.

AUTO Top & Body Co., 257-59 N. Broad St., Philadelphia, Pa.

BAILY & Co., S. E., 430 N. Queen St., Lancaster, Pa.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BIEHLS Carriage Works, 31 S. Fifth St., Reading, Pa.

BLUE Ribbon Auto & Carriage Co., 1720 Fairfield Ave., Bridgeport, Conn.

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

BOWE Carriage Co., 711 Orange St., Wilmington, Del.

BREWSTER & Co., Queensboro Bridge Plaza, Long Island City, N. Y.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BRILL Co., J. G., 62d St. & Woodland Ave., Philadelphia, Pa.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

BRUNN'S Carriage Mfg. Co., 1140-48 Main St., Buffalo, N. Y.

BRUNN & Co., 980 Ellicott St., Buffalo, N. Y.

BURR & Co., 205 W. 75th St., New York, N. Y.

CAPITOL Body Co., Ray St. & Madison Ave., Indianapolis, Ind.

CARRIAGE Woodstock Co., Owensboro, Ky.

CHICAGO Carriage & Trimming Co., 1908 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 S Michigan Ave., Chicago, Ill.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS Vehicle Woodwork Co., R. N., 3900 Chouteau Ave., St. Louis, Mo.

COLYER & Co., J., 500 Central Ave., Newark, N. J.

COOLING Carriage Co., 402 French St., Wilmington, Del.

CUNNINGHAM Son & Co., James, 18 Canal St., Rochester, N. Y.

CURRIER-CAMERON Co., 35 Elm St., Amesbury, Mass.

DANN Bros. & Co., 30-38 Franklin St., New Haven, Conn.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

DEMAREST & Co., A. T., New Haven, Conn.

DES MOINES Cabinet Co., 408-09 W. S. Ninth St., Des Moines, Ia.

DETROIT Body Co., Kercheval & Beaufait Aves., Detroit, Mich.

EARL Automobile Works, 1320 S. Main St., Los Angeles, Cal.

FARNHAM & Nelson Co., 47 Union Ave., Boston, Mass.

FEHRING Carriage Co., 601-09 Third St., Columbus, Ind.

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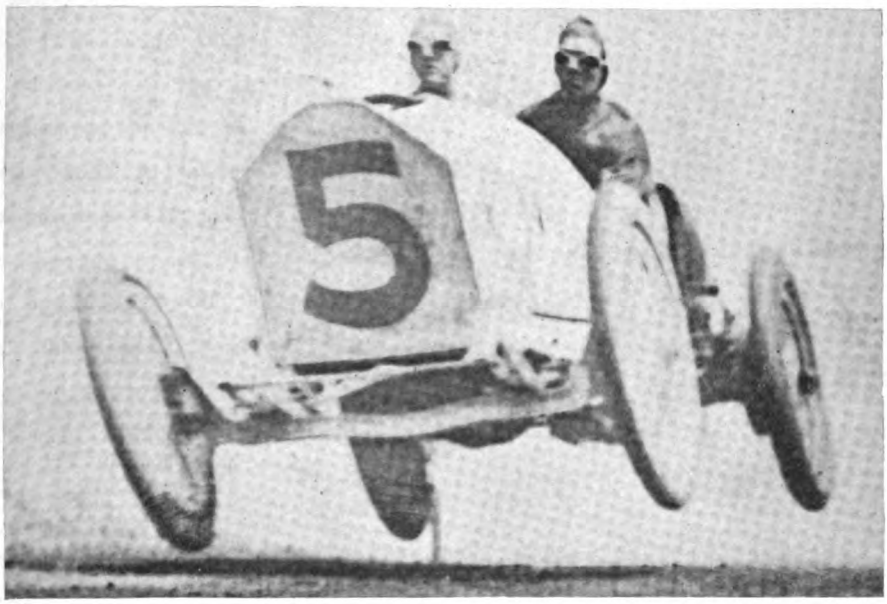
U.S. BALL BEARINGS



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Main Office and Works, Harrison Ave, Oak Park, Ill.

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BODIES (Continued)

WOOD PLEASURE CAR BODIES (Continued)

FISHER, A., 300-10 Fort St., W., Detroit, Mich.

FITZ GIBBON & Crisp, Trenton, N. J.

FLANDRAU & Co., 205 W. 75th St., New York, N. Y.

GOOLD Co., James, Broadway & Schuyler St., Albany, N. Y.

GRAVES & Co., G. O., Rahway, N. J.

GREGG-WM. D. ROGERS Co., 1926 Arch St., Philadelphia, Pa.

GRISWOLD Motor & Body Co., 660 Commonwealth Ave., Detroit, Mich.

HASSETT & Rogers, Oak St., Amesbury, Mass.

HAYES & Miller Co., 518-22 E. 57th St., New York, N. Y.

HEALEY & Co., Broadway & 51st St., New York, N. Y.

HERBERT Mfg. Co., 570 Kirby Ave., W., Detroit, Mich.

HOLCKER-ELBERG Mfg. Co., Kansas City, Mo.

HUGHEY & Son, Wm. J., 2518-20 Michigan Ave., Chicago, Ill.

HUTCHCROFT & Sons Co., D. G., Cleveland, O.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KIMBALL & Co., C. P., Chicago, Ill.
(See page 97.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y.
(See page 81.)

KLINGER, Louis, 745 E. 11th St., New York, N. Y.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

LIMOUSINE-CARRIAGE Mfg. Co., 3515 Michigan Ave., Chicago, Ill.

LOCKE & Co., 218-20 W. 84th St., New York, N. Y.

LOWELL Auto Body Co., Lowell, Mich.

MAC INNIS Bros., 118-22 22d St., Toledo, O.

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MANN-ALDRICH Carriage Co., 1300 Lincoln St., Denver, Colo.

MAYER, John M., Kingston, N. Y.

MECKEL, Fred L., 9-13 E. 13th St., Chicago, Ill.

MEDIA Carriage Mfg. Co., Media, Pa.

MIFFLINBURG Body & Gear Co., Mifflinburg, Pa.

MILBURN Wagon Co., Toledo, O.

MILLER, Hicks & Hewitt, 509-15 W. 56th St., New York, N. Y.

MONROE Body Co., Osmun St., Pontiac, Mich.

MOORE & Munger Co., 602 W. 52d St., New York, N. Y.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

NEW Haven Carriage Co., New Haven, Conn.
(See page 83.)

PAGE, Samuel K., 60 Franklin St., New Haven, Conn.

RECH-MARBAKER Co., Eighth St. & Girard Ave., Philadelphia, Pa.

RICKARDS & McLaughlin Wagon Co., Trenton, N. J.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind.
(See page 81.)

ROGERS Co., Wm. D., 1926 Arch St., Philadelphia, Pa.

SARGENT & Ham Co., 26-30 Bowker St., Boston, Mass.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHNABEL & Sons, G. A., Penn Ave. & 31st St., Pittsburg, Pa.

SCHOELER Bros., 247 Milwaukee Ave., Milwaukee, Wis.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SHIELDS Carriage Co., 11 Carriage Ave., Amesbury, Mass.

SHOWALTER Mfg. Co., 314-16 N. Hanson Ave., Indianapolis, Ind.

SIEVERS & Erdman, 294-98 Jefferson Ave., Detroit, Mich.

SJOBERG, Co., J. P., 70th St. & Ave. A, New York, N. Y.

STONE & Sons, C., 1658-74 Ogden Ave., Chicago, Ill.

THOMPSON Co., E. J. (Forbes Field), Pittsburg, Pa.

TIERNEY, P. J., Boston Post Rd., New Rochelle, N. Y.

TROY Mfg. Co., Troy, O.

UNION City Body Co., Union City, Ind.

VALENTINE, J. S., 432-38 Princeton Ave., Trenton, N. J.

WALKER Carriage Co., Merrimac, Mass.
(See page 665.)

WALKER & Co., Alfred J., 223 W. 66th St., New York, N. Y.

WAVERLEY Co., 139 S. East St., Indianapolis, Ind.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WESTERN Auto-Body Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WILLOUGHBY Co., Dwyer Ave. & Turner St., Utica, N. Y.

WRIGHT Carriage Body Co., Third Ave. & 24th St., Moline, Ill.

YORK Wagon Gear Co., York, Pa.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa.

ZIMMERMAN & Sons, F. F., Main St., Waupun, Wis.

SPECIAL DUMPING BODIES

BUDD Mfg. Co., Edward G., Aramingo & Tioga Sts., Philadelphia, Pa.

DAFFEY Bros. Motor Truck Co., San Francisco, Cal.

LALLY Commercial Body Co., 21 W. First St., (S. Boston), Boston, Mass.

LYNCH Mfg. Co., Hammond, Ind.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

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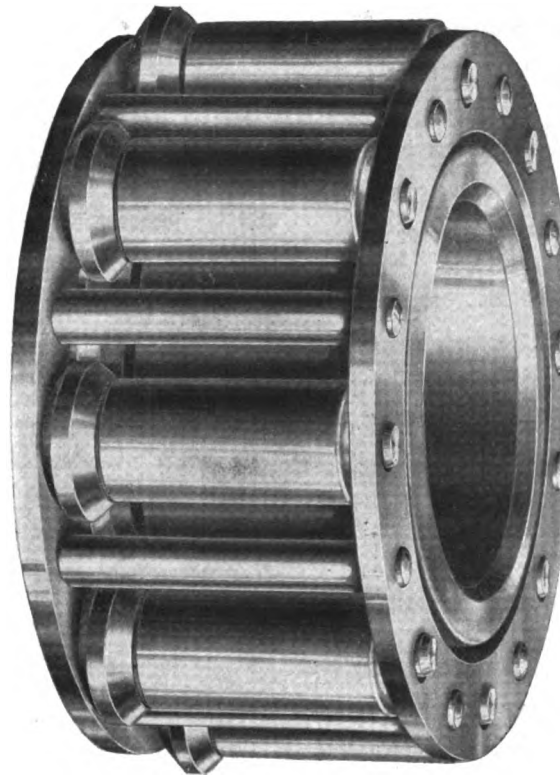
"BOWER SAVES POWER"



How Bower Saves Power!

The Bower Bearing has a cylindrical roller with a flanged head at one end. The flange takes care of end thrust, the roller of radial load. This simple division of labor gives two extraordinary advantages to Bower Bearings: (1) it reduces friction to a minimum, and (2) it obviates the need of any adjustment. Moreover, the raceways and the rollers being at all times parallel, the rollers are self-aligning. Thus a maximum diameter of rollers can be used; their speed of rotation is comparatively low; wear is minimized, and long life is assured to the bearing.

BOWER ROLLER BEARING CO.

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BODIES (Continued)

SPECIAL DUMPING BODIES (Continued)

MOTOR Truck Body Co., 320 Franklin St., Detroit, Mich.

SHADBOLT Mfg. Co., Flushing Ave. & Cumberland St., Brooklyn, N. Y.

WRIGHT Co., Thomas, 71-78 Golden St., Jersey City, N. J.

BOILERS

AUTOMOBILE STEAM BOILERS

OFELDT & Sons, August, Valley Stream, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

STEAM Carriage Boiler Co., 130 W. First St., Oswego, N. Y.

BOLTS

CAP BOLTS

(See Screws, Cap and Set)

CARRIAGE BOLTS

(See Bolts, Machine and Carriage)

MACHINE AND CARRIAGE BOLTS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

ANCHOR Bolt & Nut Co., Poughkeepsie, N. Y.

CLARK Bros. Bolt Co., Milldale, Conn. (See page 89.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

DETROIT Screw Works, Detroit, Mich. (See page 661.)

FALLS Rivet & Machine Co., Kent, O.

GRAHAM Nut Co., Pittsburg, Pa.

HASKELL Mfg. Co., Wm. H., 451 Main St., Pawtucket, R. I.

HAYDON, A. & M., 304 N. 22d St., Philadelphia, Pa.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

KIRK-LATTY Mfg. Co., Madison Ave., Cleveland, O.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

LANZ & Sons, Mathew, 2907 Carson St., Pittsburg, Pa.

NEW Castle Steel & Iron Co., New Castle, Pa.

OLIVER Iron & Steel Co., Pittsburg, Pa.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

RHODE Island Tool Co., Providence, R. I.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SHELTON Co., Shelton, Conn.

SKELLY Bolt Co., Thomas P., 24th & Callowhill Sts., Philadelphia, Pa.

SPRING AND SHACKLE BOLTS

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

BOWEN Mfg. Co., Mechanic St., Auburn, N. Y. (See page 165.)

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

ELECTRIC Welding Products Co., Cleveland, O. (See page 572.)

WINKLEY Co., Detroit, Mich. (See page 89.)

ZERK Mfg. Co., Cleveland, O.

STOVE AND TIRE BOLTS

AMERICAN Screw Co., Providence, R. I.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

CLARK Bros. Bolt Co., Milldale, Conn. (See page 89.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

FALLS Rivet & Machine Co., Kent, O.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KIRK-LATTY Mfg. Co., Madison Ave., Cleveland, O.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

TIRE BOLTS

(See Bolts, Stove and Tire)

BONNETS

MOTOR BONNETS

(See Hoods, Motor)

UNDER BONNETS

(See Pans, Dust)

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Price!

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Also Builders of Machine Tools.

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Carriage Bolts
Body Bolts
Wheel Bolts
Nuts, Rivets,
Washers, Screws,
Made of Special
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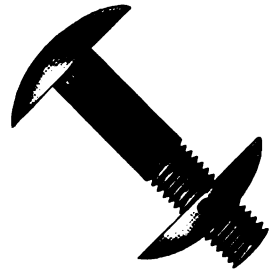

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Milldale, Conn.

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STYLE "L" OILER

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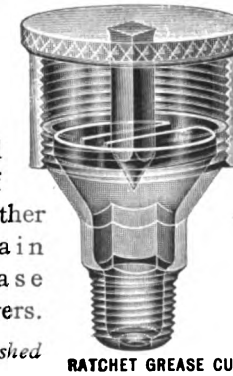

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THE WINKLEY CO. **Detroit, Mich.**
CANADIAN WINKLEY CO., Ltd. **Windsor, Ont.**

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AUTOMOBILE Apparel Co., 14 W. 22d St., New York, N. Y.

COHEN, Frank & Co., 763-71 Stone Ave., Brooklyn, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

FIRFELT—See Worcester Slipper Co.

GREEN Felt Shoe Co., Daniel, 110 E. 13th St., New York, N. Y.

PUTNAM & Co., A. H., 154 Maple St., Danvers, Mass.

WEINBERGER & Co., A., 112 South St., New York, N. Y.

WORCESTER Slipper Co., 360-70 Park Ave., Worcester, Mass. "Firfelt."

STEERING KNUCKLE BOOTS

(For enclosing Steering Connections and Universal Joints)

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 107.)

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

BAUER-LEWIS Co., 383 Holden Ave., Detroit, Mich.

CAMPBELL—See Perkins Campbell Co.

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich.
(See page 83.)

ECONOMY Stay Co., Jefferson City, Mo.

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

LEATHER Products Co., 2268 Spring Grove Ave., Cincinnati, O.

NATHAN Novelty Mfg. Co., 90 G. Reade St., New York, N. Y.
(See page 671.)

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell."
(See page 405.)

REINHOLD Belting & Supply Co., 174 W. 65th St., New York, N. Y.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.
(See page 449.)

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 371.)

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

BOWS

TOP BOWS

BROWN & Co., S. N., 111 Commercial St., Dayton, O.

CAMPBELL & Dann Mfg. Co., Tullahoma, Tenn.

CONESTOGA Bending Works, 545 N. Market St., Lancaster, Pa.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DELPHOS Bending Co., Delphos, O.

DETROIT Wood Pulley Co., 1331-37 Bellevue Ave., Detroit, Mich.

EMPIRE Bending Works, 110 S. Christian St., Lancaster, Pa.

LEBZETTER & Son Co., Philip, 241 N. Queen St., Lancaster, Pa.

MILLIKEN, Geo. W., Muncie, Ind.

MOSSMAN, Yarnelle & Co., Fort Wayne, Ind.

SCHERER & Co., H., Detroit, Mich.

SHEPARD & Sons, H. G., James & River Sts., New Haven, Conn.

STARR, D. H., Highland, N. Y.

TOLEDO Bending Co., Toledo, O.

UNION Bow Co., 725-35 Superior Ave., N. W., Cleveland, O.

WAYNE Spoke & Bending Works, Fort Wayne, Ind.

WHEEL & Wood Bending Co., 141 John St., Bridgeport, Conn.

BOXES

METAL BATTERY BOXES

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

BRISCOE Mfg. Co., Detroit, Mich.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 91.)

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich.
(See pages 78 and 79.)

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O. "Kinwood."
(See page 153.)

KINWOOD—See Kinsey Mfg. Co.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

NATIONAL Can Co., Detroit, Mich.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SLY Mfg. Co., W. W., Cleveland, O.

STANDARD Steel Box Co., Bridgeville, Pa.

VICTOR Auto Parts Co., Second & Elm Sts., Cincinnati, O.

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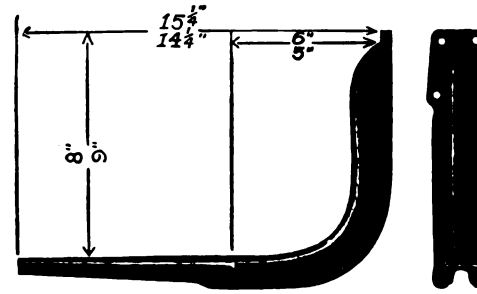

GLOBE STEP HANGERS

Lighter, stronger, better than drop forgings. No machining needed—they come ready to bolt on the frame.

These step hangers are usually a make-to-blue print proposition. However, we have tools for some sizes and your requirements may be met by one of these.

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1250 West 76th St. Cleveland, Ohio

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BOXES (Continued)

WOOD BATTERY BOXES

(See also Holders, Battery)

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

BLISS Mfg. Co., R., Pawtucket, R. I.

CHURCHILL Cabinet Co., 2119 Churchill St., Chicago, Ill.

KARREMAN Co., Grand Rapids, Mich.

STANDARD Cabinet Mfg. Co., Peru. Ind.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

SPARK COIL BOXES

AUTO Body Co., Lansing, Mich. (See page 83.)

BLISS Mfg. Co., R., Pawtucket, R. I.

BUBECK & Guerin, 161-63 W. 18th St., New York, N. Y. (See page 493.)

CHURCHILL Cabinet Co., 2119 Churchill St., Chicago, Ill.

KARREMAN Co., Grand Rapids, Mich.

MARON Co., Frank A., Bush Terminal, Brooklyn, N. Y.

STANDARD Cabinet Mfg. Co., Peru. Ind.

UNION Hardware Co., Torrington, Conn.

WABASH Cabinet Co., Wabash, Ind.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

METAL TOOL BOXES

(For Tool Bags—See Bags, Tool)

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 333.)

BRISCOE Mfg. Co., Detroit, Mich.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich. (See pages 78 and 79.)

KINSEY Mfg. Co., Toledo, O. "Kinwood." (See page 153.)

KINWOOD—See Kinsey Mfg. Co.

LAWSON Co., F. H., Cincinnati, O.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

STANDARD Steel Box Co., Bridgeville, Pa.

VICTOR Auto Parts Co., Second & Elm Sts., Cincinnati, O.

WOOD TOOL BOXES

(For Tool Bags—See Bags, Tool)

AMERICAN Body Co., 1255-63 Niagara St., Buffalo, N. Y.

DETROIT Auto Dash Co., 519-21 Beaubien St., Detroit, Mich. (See page 427.)

MARON Co., Frank A., Bush Terminal, Brooklyn, N. Y.

STANDARD Cabinet Mfg. Co., Peru, Ind.

TOLLNER'S Sons Co., Chas., Pulaski, N. Y.

WEST Box Co., F. M., 225 Liberty St., Springfield, Mass.

BRACKETS

AUTOMATIC HEADLIGHT BRACKETS

AUBEUF Co., F. H., Oneida, N. Y.

AUTO Protector Co., 58 Tyler St., Springfield, Mass. "Clear-Ahead." (See page 577.)

AUTOMATIC Lamp Control Co., 123 E. First St., Dayton, O. "Dayton."

CLEAR-AHEAD—See Auto Protector Co.

DAYTON—See Automatic Lamp Control Co.

HEADLIGHT Support Co., Dime Bank Bldg., Detroit, Mich.

POUGHKEEPSIE Utilities Corp., Poughkeepsie, N. Y. "Seeaturn."

RADIALITE—See Winona Carriage Co.

RHOADS Automobile Headlight Adjuster Co., 1720 Central Ave., Kansas City, Kans.

SEEATURN—See Poughkeepsie Utilities Corp.

SEEROAD Lamp Swivel Co., Vanadium Bldg. Pittsburg, Pa.

WINONA Carriage Co., Winona, Minn. "Radialite."

HEADLIGHT BRACKETS

CLEVELAND Hardware Co., Cleveland, O.

GARAGE Equipment Mfg Co., Milwaukee, Wis. (See page 221.)

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J.

SIDE AND TAIL LAMP BRACKETS

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

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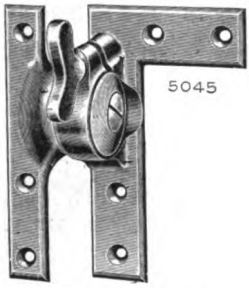

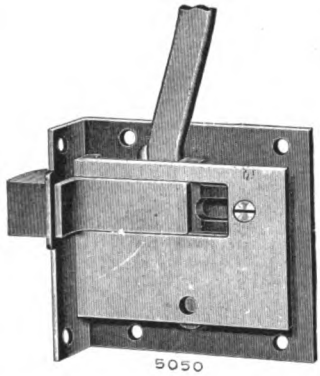

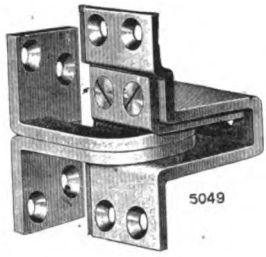

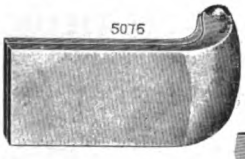

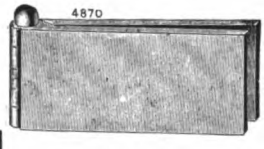

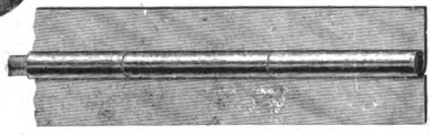

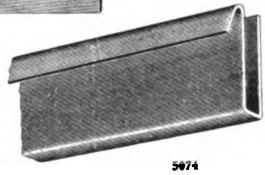

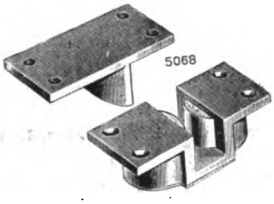

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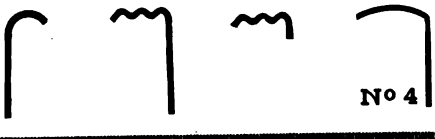

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BRAKES

EXPANDING AND CONTRACTING BRAKES

DUPLEX—See Royal Equipment Co.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa. (See page 383.)

RAYMOND—See Royal Equipment Co.

ROYAL Equipment Co., 1372 Bostwick Ave., Bridgeport, Conn. "Raymond," "Duplex." (See page 95.)

DROP OR SPRAG BRAKES

PERFECT—See Youse Co.

YOUSE Co., E. S., 46 N. Fifth St., Reading, Pa. "Perfect."

BRASS

SHEET AND ROD BRASS AND COPPER

(For Tubing—See Tubing, Brass. For Castings—See Castings, Aluminum)

AMERICAN Brass Co. (Ansonia Brass & Copper Branch), Ansonia, Conn.

AMERICAN Brass Co. (Coe Brass Branch), Torrington, Conn.

AMERICAN Brass Co. (Benedict & Burnham Branch), Waterbury, Conn.

AMERICAN Brass Co. (Waterbury Brass Branch), 26 Crane St., Waterbury, Conn.

AMERICAN Brass Co. (Kenosha Branch), Kenosha, Wis.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 329.)

BUFFALO Copper & Brass Rolling Mill, Military Rd. & Hertel Ave., Buffalo, N. Y.

CHASE Rolling Mill Co., Waterbury, Conn.

DETROIT Copper & Brass Rolling Mills, Clark Ave. & Wabash R. R., Detroit, Mich.

MANHATTAN Brass Co., 328 E. 28th St., New York, N. Y.

MICHIGAN Copper & Brass Co., 1611 Jefferson Ave., W., Detroit, Mich. "Wolverine."

NEW HAVEN Copper Co., Seymour, Conn.

NEW JERSEY Tube Co., Newark, N. J.

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

RANDOLPH-CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

SCOVILL Mfg. Co., 99 Mill St., Waterbury, Conn.

SEYMOUR Mfg. Co., Seymour, Conn.

STAMFORD German Silver Co., Stamford, Conn.

TAUNTON-NEW BEDFORD Copper Co., Taunton, Mass.

WOLVERINE—See Michigan Copper & Brass Co.

BRAZIERS

CAST IRON BRAZIERS

CAST Iron Brazing & Mfg. Co., Manchester, N. H.

GERLOFF, Chas. W., 430 Water St., Norfolk, Va.

NEW York Brazing Co., 196 11th Ave., New York, N. Y.

PITTSBURGH Reinforced Brazing & Machine Co., 2525 Liberty Ave., Pittsburg, Pa.

VULCAN Brazing & Machine Co., 312 N. 16th St., Philadelphia, Pa.

BROADCLOTH

UPHOLSTERY BROADCLOTH

(See also Trimmings, Cloth and Carpet)

AMERICAN Mills Co., 17th St. & Fourth Ave., New York, N. Y.

BRYN MAWR—See Haartz, W. A. & J. C.

HAARTZ, W. A. & J. C., Boston, Mass. "Bryn Mawr." (See page 251.)

ROY Woolen Co., Watervliet, N. Y.

SLATER & Sons, Webster, Mass.

WATERLOO Woolen Mfg. Co., Waterloo, N. Y.

BRUSHES

CARBON MOTOR BRUSHES

AMERICAN Carbon & Battery Co., Signal Hill, Ill.

JEANDRON, W. J., 172 Fulton St., New York, N. Y. (Importer.) "Le Carbone."

LE CARBONE—See Jeandron, W. J.

META—See Nungesser Carbon & Battery Co.

NATIONAL Carbon Co., Cleveland, O. (See page 65.)

NUNGESSER Carbon & Battery Co., 1170 E. 38th St., Cleveland, O. "Meta."

SPEER Carbon Co., St. Marys, Pa.

STACKPOLE Carbon Co., St. Marys, Pa. (See page 607.)

SPARK PLUG BRUSHES

AMERICAN Wire Brush Co., 202-04 Centre St., New York, N. Y.

OSBORN Mfg. Co., 5401 Hamilton Ave., N. E., Cleveland, O.

BUCKETS

COLLAPSIBLE BUCKETS

CHANNON Co., H., 150 N. Market St., Chicago, Ill.

DUPLEX—See Planet Co.

FAULTLESS—See National Mfg. Co.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

NATIONAL Mfg. Co., 17th & Locust Sts., Des Moines, Ia. "Faultless."

PLANET Co., Westfield, Mass. "Duplex."

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BUCKLES

STRAP BUCKLES

ANCHOR—See North & Judd Mfg. Co.

COWLES & Co., C., New Haven, Conn. (See page 177.)

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

FRAZER & Jones Co., Syracuse, N. Y.

LYNCH Mfg. Co., Madison, Wis. (Lock.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn. "Anchor."

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J. (See page 271.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

TURN-BUCKLES

(See Turn-Buckles, Wrought)

BULBS

RUBBER HORN BULBS

CANFIELD Co., H. O., Bridgeport, Conn.

DAVOL Rubber Co., Providence, R. I.

GOODRICH Co., B. F., Akron, O.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

WALPOLE Tire & Rubber Co., Walpole, Mass.

BUMPERS

AUTOMOBILE BUMPERS

(For protecting Lamps and Radiators)

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ATLAS—See Toffler Co.

AUTO Cushion Fender Co., Clinton Bldg., Columbus, O.

AUTO Parts Mfg. Co., 171 Michigan St., Milwaukee, Wis. "Badger."

BADGER—See Auto Parts Mfg. Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill.

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye," "Star," "Royal."

CHICAGO—See Western Brass Mfg. Works.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. "Ross."

COMMON SENSE—See Pratt Mfg. Co.

CONOVER—See New Jersey Tube Co.

COX Brass Mfg .Co., Albany, N. Y. (See page 467.)

DIAMOND—See Sager Co.

ESSEX—See S.B.R. Specialty Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Hercules," "Universal." "Gemco," "Simplex." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GROSSMAN Mfg. Co., Emil, Bush Terminal. Brooklyn, N. Y. "Swivelaction."

HALLADAY Co., L. P., Streator, Ill. "Imperial," "Universal."

HARROUN—See Turner Brass Works.

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. (See page 367.)

HERCULES—See Garage Equipment Mfg. Co.

HERCULES—See Milwaukee Auto Engine & Supply Co.

IMPERIAL—See Halladay Co.

KIMBALL & Co., C. P., Chicago, Ill. (See page 97.)

McGREGOR—See U. S. Auto Bumper Co.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis. "Hercules."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium." (See page 507.)

NATIONAL Automatic Vehicle Fender Co., 1446 N. 16th St., Omaha, Neb.

NEW JERSEY Tube Co., Newark, N. J. "Conover."

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill. "Common Sense."

RADIUM—See Milwaukee Auto Specialty Co

ROSS—See Chicago-Racine Aluminum, Brass & Iron Works.

ROYAL—See Central Brass & Fixture Co.

S.B.R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Essex."

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "Diamond," "Simplex."

SIMPLEX—See Garage Equipment Co.

SIMPLEX—See Sager Co.

SMITH Co., H. Lund, 231 Paterson Ave., Paterson, N. J.

STANDARD Brass & Iron Works, 1820 St. Paul Ave., Milwaukee, Wis.

STAR—See Central Brass & Fixture Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STEVENS Mfg. & Supply Co., 1223-27 Wabash Ave., Chicago, Ill.

SWIVELACTION—See Grossman Mfg. Co.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y. "Atlas."

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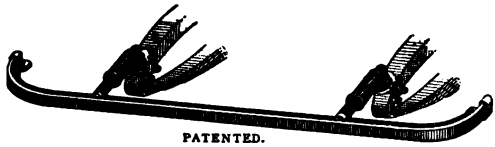

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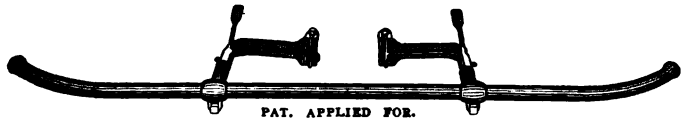
McGREGOR'S T BAR BUMPER



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Manufacturers of

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AUTO BUMPERS

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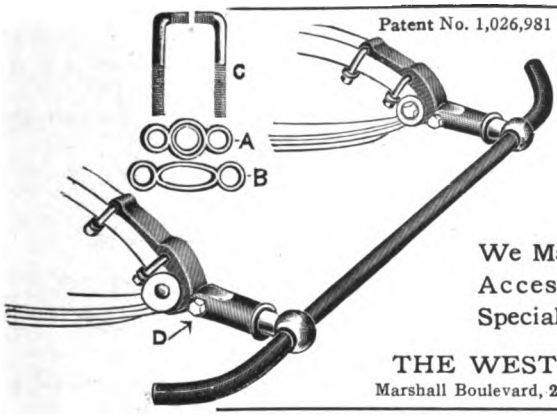
ILL.



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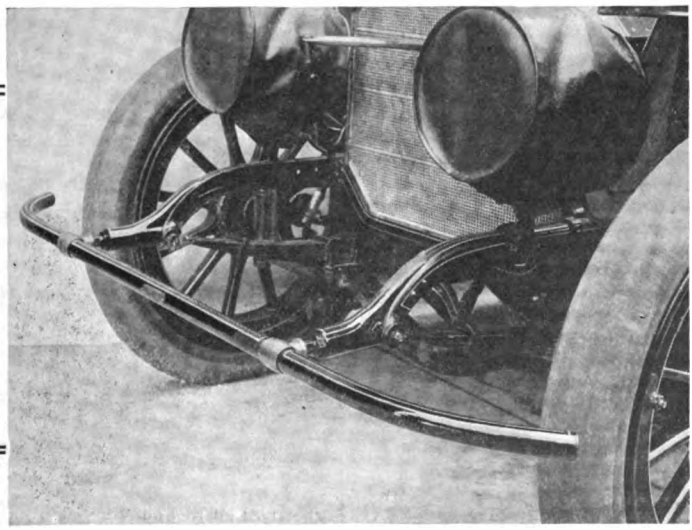
Protects Radiators and Lamps



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AUTOMOBILE BUMPERS (Continued)

TURNER Brass Works, Sycamore, Ill. "Harroun."

U. S. Auto Bumper Co., 20 E. 20th St., Chicago, Ill. "McGregor."
(See page 97.)

UNIVERSAL—See Garage Equipment Mfg. Co.

UNIVERSAL—See Halladay Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. "Chicago."
(See page 97.)

RUBBER SPRING BUMPERS

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O.

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

CANFIELD Co., H. O., Bridgeport, Conn.

CANFIELD Rubber Co., Bridgeport, Conn.

CENTURY—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Century."
(See page 167.)

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 585.)

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa.
(See page 419.)

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

MANSFIELD Tire & Rubber Co., Mansfield, O.

MATTSON Rubber Co., Lodi, N. J.
(See page 419.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick St., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn.

THERMOID Rubber Co., Trenton, N. J.
(See page 499.)

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 371.)

WALPOLE Tire & Rubber Co., Walpole, Mass.

BURNERS

ACETYLENE LAMP BURNERS

ALCO—See American Lava Co.

AMBO—See American Lava Co.

AMERICAN Lava Co., Chattanooga, Tenn. "Hela," "Alco," "De Luxe," "No-Name," "Ambo," "Hilo," "Duro," "Hexo."

AURORA—See Steward Mfg. Co.

BRAY ELTA—See Crane Co.

BRAY LUTA—See Crane Co.

BRAY RONI—See Crane Co.

CARROLL, J. B., 3057 Carroll Ave., Chicago, Ill. "Hahn."

CRANE Co., William M., 16-20 W. 32d St., New York, N. Y. "Bray Roni," "Bray Elta," "Bray Luta."
(See page 99.)

CRESCENT—See Kirchberger & Co.

DE LUXE—See American Lava Co.

DRAKE Acetylene Burner Co., San Jose, Cal.

DURO—See American Lava Co.

HAHN—See Carroll, J. B.

HELA—See American Lava Co.

HEXO—See American Lava Co.

HILO—See American Lava Co.

KIRCHBERGER & Co., M., 374-80 Second Ave., New York, N. Y. "Crescent," "Von Schwartz," "Perfection," "Koro," "Matador," "Victory.'

KORO—See Kirchberger & Co.

LENHART Mfg. Co., 246 N. Delaware Ave., **Philadelphia, Pa. "Tri-Radiant."**

MATADOR—See Kirchberger & Co.

NO-NAME—See American Lava Co.

NOVELTY Burner Co., Chattanooga, Tenn. "Queen Eta."

PERFECTION—See Kirchberger & Co.

QUEEN ETA—See Novelty Burner Co.

STANDARD Acetylene Burner Co., Tasso, Tenn.

STARR—See Steward Mfg. Co.

STEWARD Mfg. Co., D. M., Chattanooga, Tenn. "Wonder," "Starr," "Aurora."

TENNESSEE Burner Mfg. Co., Chattanooga, Tenn. "X. L."

TRI-RADIANT—See Lenhart Mfg. Co.

VICTORY—See Kirchberger & Co.

VON SCHWARZ—See Kirchberger & Co.

WONDER—See Steward Mfg. Co.

X. L.—See Tennessee Burner Mfg. Co.

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(Automatic and Electric Lighting Burners; see also Lighters, Acetylene Lamp)

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AMERICAN Lava Co., Chattanooga, Tenn. "Alco Chicago," "Universal."

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For Acetylene

Elta—Roni—Luta

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Bray Acetylene Burners

Bray's Famous "Roni" is the only flat-flame, one-hole, ATMOSPHERIC burner made. Flame cannot get out of alignment and crack lens or reflector. Can be easily cleaned in the dark with a brush.

Bray's "Elta" can be turned down without carbonizing the tip. Also ATMOSPHERIC. Ideal for driving in and out of cities where ordinance forbids bright headlights. The most economical burner made.

Bray's "Luta" is consistent with Bray quality. It will last longer and give better service than any other acetylene burner made.

Bray burner tips are made of a special enamel, hard as flint and smooth as glass, impervious to burning acetylene and easily cleaned. Arms of "Elta" and "Luta" are made of extra heavy brass and cannot warp or twist. Bray Burners are absolutely guaranteed.

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SPECIAL ACETYLENE LAMP BURNERS (Continued)

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MATCHLESS—See Advance Motor Specialties Co.

MORGAN, B., John St., Newport, R. I.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

UNIVERSAL—See American Lava Co.

GASOLINE AND KEROSENE BURNERS

(For Steam Boilers)

FORG, Peter, 50 Park St., Somerville, Mass.

OFELDT & Sons, August, Valley Stream, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

SIMMONS, H. C., North Burlington, Vt.

BUTTONS

UPHOLSTERY BUTTONS

ATLAS Tack Co., Fairhaven, Mass.

COWLES & Co., C., New Haven, Conn. (See page 177.)

CRANDAL, Stone & Co., Binghamton, N. Y. (See page 379.)

HIGGIN Mfg. Co., Newport, Ky.

JACKSON Cushion Spring Co., Jackson, Mich. (See page 569.)

LANDERS Bros. Co., Toledo, O. (See page 107.)

LOUNSBERY & Sons, G. H., 107-09 W. Third St., Cincinnati, O.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILONITE—See Morley Mfg. Co.

MORLEY Mfg. Co., 120 Boylston St., Boston, Mass. "Milonite."

NEIDER Co., F. A., Augusta, Ky.

NEW Haven Button Co., 161 Brewery St., New Haven, Conn.

READE, Chas. W., 103 Court St., New Haven, Conn.

TOCKWOTTON Co., 79 S. Main St., Providence, R. I.

TUFTING Machine Supply Co., Detroit, Mich.

WHITE Co., L. C., 214 Bank St., Waterbury, Conn.

CABLE

IGNITION CABLE

(See Wire, Insulated)

WIRE CABLE

(See Rope, Bronze Wire; also Rope, Steel Wire)

CABLES

TOP CABLES

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

CAM-SHAFTS

FINISHED OR MACHINED CAM-SHAFTS

BILLINGS & Spencer Co., Hartford, Conn.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 607.)

JACKSON Motor Shaft Co., Jackson, Mich. (See page 101.)

KRUPP—See Prosser & Son.

MUSKEGON Motor Specialties Co., Water St., Muskegon, Mich. (See page 531.)

PENINSULAR Auto Parts Co., 46 Champlain St., Detroit, Mich.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

WILCOX-McKIM Co., Saginaw, Mich. (See page 197.)

CANOPIES

AUTOMOBILE CANOPIES

(See Tops, Automobile)

CANS

OILING CANS

(For Oil Guns—See Guns, Oil)

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BLOOMER, R. E., Keithsburg, Ill. "Cannon."

CANNON—See Bloomer, R. E.

CONSOLIDATED Fruit Jar Co., New Brunswick, N. J.

DELPHOS Mfg. Co., Pierce St., Delphos, O.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 467.)

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HERO Mfg. Co., Gaul & Adams Sts., Philadelphia, Pa.

HOWLAND—See Maple City Mfg. Co.

McCLINTOCK & Irvine Co., Neville St. & P. R. R., Pittsburg, Pa.

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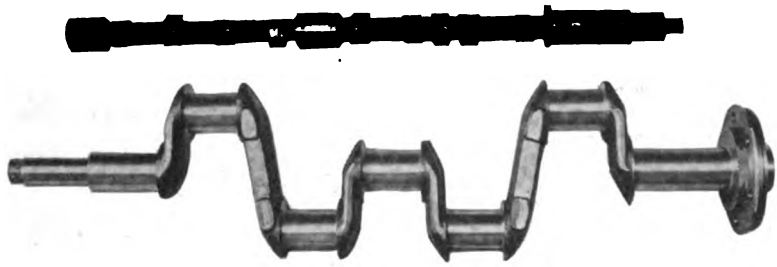
Finished

Cam and Crank Shafts

of

Superior Quality



We are in the age of specialization and that is why we are specializing and placing all our hopes of business success on

Cams and Cranks Only

Our new fireproof plant, which is equipped with the latest and best machinery, and with our

Special Testing Machines

of our own design, makes it possible for our organization, composed of expert mechanics, to produce more accurate work.

Estimates Furnished on forgings finished complete, or finishing only.

The Jackson Motor Shaft Co.

Jackson, Michigan

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CANS (Continued)

OILING CANS (Continued)

MAPLE City Mfg. Co., Monmouth, Ill. "Howland."

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

NOERA Mfg. Co., Waterbury, Conn.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VOGEL & Bros., Wm., 37 S. Ninth St., Brooklyn, N. Y.

WALL Mfg. Supply Co., P., 720 Preble Ave., Pittsburg, Pa.

WILSON & Co., F. Cortez, 323 W. Lake St., Chicago, Ill.

CAPS

HUB CAPS

(Pressed or Stamped Caps. For Cast Caps—See Castings)

ACKLIN Stamping Co., Toledo, O.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 233.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CROSBY Co., Buffalo, N. Y.

GIER & Dail Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 91.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 429.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 169.)

MOTORISTS CAPS

ADIRONDACK—See Spear-Martin Fur Co.

AMERICAN-BUFFALO Robe Co., 1-7 Howell St., Buffalo, N. Y.

BISHOP Co., J. H., Wyandotte, Mich.

BRADLEY Knitting Co., Delevan, Wis.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

DINNER Co., Isaac H., 694 Washington St., Boston, Mass.

FAVORITE Knitting Mills, 1388 W. Sixth St., Cleveland, O.

FORMAN & Co., E., 578 Washington St., Boston, Mass.

FREEMAN-HIRSCHSTICK Co., 227 W. Madison St., Chicago, Ill.

GILBERT Mfg. Co., New Haven, Conn.

HENDRICKSON Hat Co., A. P., 127-29 S. Meridian St., Indianapolis, Ind.

KAPLAN, Frank & Dunn, 113-15 University Pl., New York, N. Y.

KLING Bros. & Co., 291 Fifth Ave., Chicago, Ill.

LASKY & Levy, 756-60 Broadway, New York, N. Y.

MARSHALL, P. V. & E. L., 49 W. Larned St., Detroit, Mich. "Shapkes."

MORAWETZ Co., 217-25 E. Water St., Milwaukee, Wis.

PONTIAC Knitting Co., Pontiac, Mich.

REVILLON Freres, 19 W. 34th St., New York, N. Y.

SHAPKES—See Marshall, P. V. & E. L.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

SPEAR & CO., Woodhaven, N. Y.

BRASS RADIATOR CAPS

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 341.)

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

RUBBER RADIATOR CAPS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

CONDENSITE Co. of America, Belleville Ave., Glen Ridge, N. J.

LUZERNE Rubber Co., Trenton, N. J.

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

RUBBERSET Co., 56 Ferry St., Newark, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

CARBIDE

CALCIUM CARBIDE

AMERICAN Carbolite Sales Co., 301 S. 55th Ave., W., Duluth, Minn. "Carbolite."

CARBOLITE—See American Carbolite Sales Co.

UNION Carbide Sales Co., 122 S. Michigan Blvd., Chicago, Ill.

CARBURETERS

GASOLINE CARBURETERS

(For Mixing Valves or Vaporizers—See Vaporizers)

AIR-FRICTION Carburetor Co., Dayton, O.

B-D—See Detroit Motor Casting Co.

BALL SPRAY—See Shain, Chas. D.

BENNETT — See Wilcox - Bennett Carbureter Co.

BINGHAM Mfg. Co., 227 Prospect Ave., N. W., Cleveland, O. "Climax."

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Mayer Carburetor for 1913

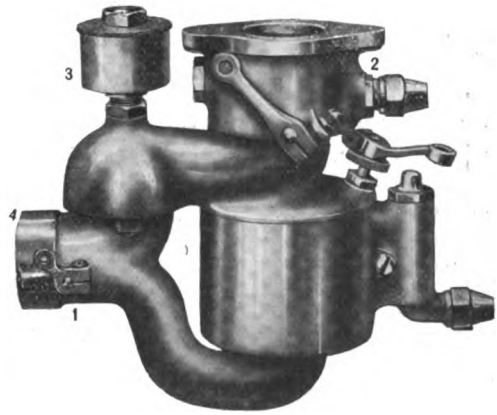
Notice the four essential features on the Mayer 1913, not found on other carburetors.

1. **Starting Valve** to start your car in cold weather.

2. **Hot Water Jacket** to vaporize gasoline in cold weather.

3. **Dash Pot Auxiliary Air Control** to make your car accelerate and run smoothly.

4. Provision for attaching **Hot Air Tube** leading to exhaust manifold, supplying hot air to main and auxiliary air intakes.



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2673 MAIN STREET, BUFFALO, N. Y.

A 1914 Carburetor

The KENNEDY

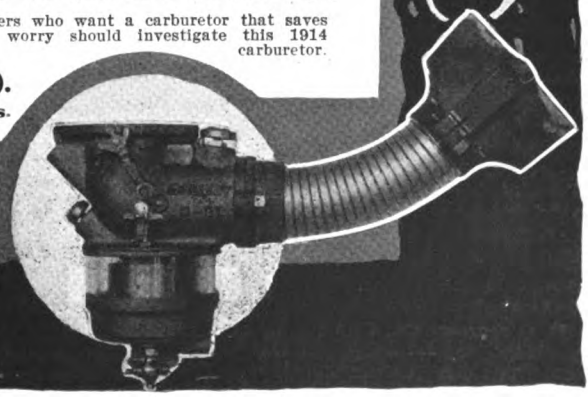
Absolutely the last word in carburetor construction. It simplifies the carburetor proposition for the manufacturer—is entirely satisfactory for the dealer to sell—and most economical for the owner to use. Using *all Hot Air* for mixture. Not only does it actually start in all weathers, but it is *really* simple and *entirely fireproof*. There are only two adjustments—low speed needle valve, and high speed needle valve.

Engineers and dealers who want a carburetor that saves money, trouble and worry should investigate this 1914 carburetor.

Write For Our Booklet.

L. D. ROBBINS CO.

LYNN :: Mass.



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CARBURETERS (Continued)

GASOLINE CARBURETERS (Continued)

BOWERS—See Gilbert Mfg. Co.

BREEZE, George A., 629 Bellevue Ave., Detroit, Mich. "Zephyr."

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

BYRNE, Kingston & Co., 1040 Webster St. Kokomo, Ind. "Kingston."

C. R. G. Mfg. Co., Saugus, Mass.

CARTER Carburetor Co., 912 N. Market St., St. Louis, Mo.

CLEVELAND Carbureter Co., 1232 Addison Rd., Cleveland, O.

CLIMAX—See Bingham Mfg. Co.

D. K. W.—See Duquesne Auto Accessory Co.

DALEY, Walter A., 3520 Melrose St., Chicago, Ill.

DETROIT Carbureter Co., Detroit, Mich. "E. C. B."

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich. "B-D."

DUQUESNE Auto Accessory Co., New Kensington, Pa. "D. K. W."

E. C. B.—See Detroit Carbureter Co.

EXCELSIOR Needle Co., Torrington, Conn.

ESS-ESS—See Scott & Sons Co.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. "Rayfield."

FLECHTER—See Trenton Brass and Machine Co.

FOLBERTH Auto Specialty Co., 2929 Lorain Ave., Cleveland, O.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill. "Vortex."

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

G. & A. Carburettor Co., 142 E. 14th St., New York, N. Y.

GALLAGHER—See Lehigh Valley Foundry & Mfg. Co.

GARDNER Carbureter & Brass Works, Shreveport, La.

GILBERT Mfg. Co., New Haven, Conn. "Bowers."

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y. "Maco."

H & N Sales Co., 38-40 W. 62d St., New York, N. Y.
(See page 597.)

HEINZE Electric Co., Lowell, Mass.
(See page 581.)

HEITGER Carbureter Co., 1127 Beecher St., Indianapolis, Ind.

HOLLEY Bros. Co., Detroit, Mich.

HOLTZER-CABOT Electric Co., Brookline, Mass. "Newcomb."
(See page 231.)

HOMO Co. of America, 3202-06 Oxford St., Philadelphia, Pa.

HOYT Carbureter & Automobile Co., 45 Union Ave., Boston, Mass.

K. D. Carburetor Co., 5915 Bonna Ave., Cleveland, O.

KENNEDY—See Robbins Co.

KINGSTON—See Byrne, Kingston & Co.

KRAUSE Mfg. Co., 654 Franklin St., Detroit, Mich.

KRICE Carburetor Co., McLean & Oakland Aves., Detroit, Mich.

L-A-W—See Utica Steam Gauge Co.

LEHIGH Valley Foundry & Mfg. Co., Easton, Pa. "Gallagher."
(See page 105.)

LONGUEMARE Carburetor Co., 246 W. 59th St., New York, N. Y. (Importers.)

MACO—See Gleason-Peters Air Pump Co.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 477.)

MARVEL Carbureter Co., Mill St., Flint, Mich.

MAXI Co., 216 High St., Newark, N. J.

MAYER Carburetor Co., 2678 Main St., Buffalo, N. Y.
(See page 103.)

MONARCH Valve Co., 112 Front St., Brooklyn, N. Y.

MOSLER & Co., A. R., Mt. Vernon, N. Y.
(See page 309.)

MOTSINGER Device Mfg. Co., Lafayette, Ind.

MUIR Carburetter Co., Equitable Bldg., Baltimore, Md.

NATIONAL Auto Accessory Co., Salem Depot, N. H.

NEWCOMB—See Holtzer-Cabot Electric Co

NORTH Chicago Machine Co., 22d St. & Commonwealth Ave., North Chicago, Ill. "Palmbla."

PALMBLA—See North Chicago Machine Co

PARKIN & Son, 2417 N. Broad St., Philadelphia, Pa.

PRICE, John R., Newark, N. J.

QUADRUPLEX—See Walker & Co.

RAYFIELD—See Findeisen & Kropf Mfg. Co

RAYMOND Carburetor Co., Des Moines, Ia.

ROBBINS Co., L. D., Lynn, Mass. "Kennedy."
(See page 103.)

ROBY Carbureter Co., Indianapolis, Ind.

S. U.—See Simms Magneto Co.

SCHEBLER—See Wheeler & Schebler.

SCOTT & Sons Co., Medford, Mass. "Ess-Ess."
(See page 595.)

SHAIN, Chas. D., Box 53, Station L., Brooklyn, N. Y. "Ball Spray."
(See page 597.)

SIMMS Magneto Co., Bloomfield, N. J. "S. U."

SIRO Carburetor Mfg. Co., Northampton, Mass.
(See page 597.)

STEVENS Co., E. W., 1628 Real Estate Trust Bldg., Philadelphia, Pa.
(See page 591.)

STEWART Machine Works, Alfred Co., 1008 Santee St., Los Angeles, Cal.

STROMBERG Motor Devices Co., Chicago, Ill.

SUNDERMAN Safety Carburetor Co., 117 Broadway, Newburgh, N. Y.

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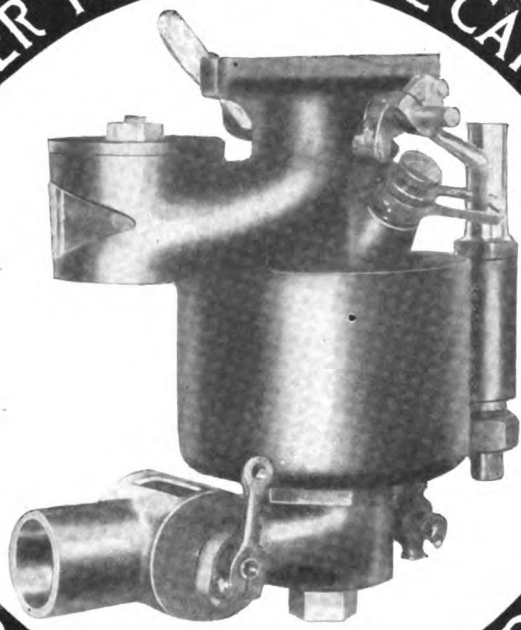
IT'S DIFFERENT

GALLAGHER MECHANICAL CARBURETORS



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No weights - No springs
No automatic movements

Under the control of the driver — Always the same

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EASTON PA.

BRASS & ALUMINUM CASTINGS - VALVES & COCKS

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CARBURETERS (Continued)

GASOLINE CARBURETERS (Continued)

TRENTON Brass & Machine Co., Trenton, N. J. "Flechter."

UTICA Steam Gauge Co., Frankfort, N. Y. "L-A-W."

VORTEX—See Fowler Lamp & Mfg. Co.

WALKER & Co., O. S., Rockdale St., Worcester, Mass. "Quadruplex."

WHEELER & Schebler, Indianapolis, Ind. (See page 597.)

WILCOX-BENNETT Carburetter Co., 1030 Marshall St., N. E., Minneapolis, Minn. "Bennett."

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

ZENITH Carburetor Co., Detroit, Mich.

ZEPHYR—See Breeze, George A.

KEROSENE CARBURETERS

BARNARD Mfg. Co., 3300 Maple Ave., Los Angeles, Cal.

BENNETT—See Wilcox-Bennett Carburetter Co.

CAMDEN-ANCHOR Rockland Machine Co., Camden, Me. "Knox."

CHAMBRAY Carburetor Co., 707 Woodward Ave., Detroit, Mich.

ELECTRIC Renovator Mfg. Co., Pittsburg, Pa.

G. C. Vaporizer Co. of America, 1790 Broadway, New York, N. Y.

KNOX—See Camden-Anchor Rockland Machine Co.

MASTER Carburetor Co., 922-24A Los Angeles St., Los Angeles, Cal.

RUSSELL Eureka Carburetter Co., Rudd, Ia.

UNIVERSAL Oil Converter Co., 47 West St., New York, N. Y.

WILCOX-BENNETT Carburetter Co., 1030 Marshall St., N. E., Minneapolis, Minn. "Bennett."

CARPET

COACH CARPET

(See also Trimmings, Cloth and Carpet)

COCHRANE Mfg. Co., East Dedham, Mass.

DOBSON, John & James, 809 Chestnut St., Philadelphia, Pa.

HIRST-ROGER Co., Allegheny & Kensington Aves., Philadelphia, Pa.

SCHOFIELD, Mason & Co., Fairhill, Reese & Cumberland Sts., Philadelphia, Pa.

CASES

BATTERY CASES

(See Boxes, Battery)

CARD CASES

(See Cases, Toilet)

CURTAIN CASES

(For carrying top curtains when not in use)

AMERICAN Vulcanized Fibre Co., Wilmington, Del. "Vul Cot." (See page 179.)

VUL COT—See American Vulcanized Fibre Co.

MEDICAL EMERGENCY CASES

ACCIDENT Cabinet Co., Kalamazoo, Mich.

BURROUGHS, Wellcome & Co., 35-39 W. 32d St., New York, N. Y. "Tabloid."

K. W. P. Co., 907 S. Michigan St., South Bend, Ind.

SHARP & Smith, 103 N. Wabash Ave., Chicago, Ill.

TABLOID—See Burroughs, Wellcome & Co.

SPARK COIL CASES

(See Boxes, Spark Coil)

SPARK PLUG CASES

(Leather cases for holding spare plugs)

ALGCO—See Auburn Leather Goods Co.

AUBURN Leather Goods Co., Auburn, N. Y. "Algco."

GORDON—See Vehicle Apron & Hood Co.

HOPEWELL Bros., Newton, Mass. (See page 671.)

NATHAN Novelty Mfg. Co., 906 Reade St., New York, N. Y. (See page 671.)

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

TIRE AND TUBE CASES

(For covering spare tires and tubes)

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y. (See page 107.)

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill. "Howard," "Chicago."

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

CHICAGO—See Atlas Specialty Mfg. Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

DAFOE-EUSTICE Co., 54 Lafayette Blvd., Detroit, Mich. "Duk-Bak."

DIAMOND—See Gilbert Mfg. Co.

DUK-BAK—See Defoe-Eustice Co.

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

FITZWELL—See Niagara Auto-Cover Co.

FULLER Co., G. W., 182-84 Asylum St., Hartford, Conn.

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MOHAIR, STRAIN STRAPS, TOP MATERIAL

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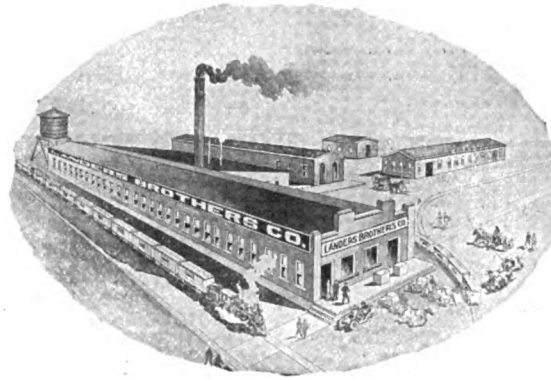

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ENAMELED AND RUBBER MUSLINS, DRILLS AND DUCKS

LANDERS BROTHERS CO.

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Prompt Shipments Best Goods Lowest Prices

The ALLEN TIRE CASE

is made of finest quality enamel duck, absolutely waterproof. It gives perfect protection to the spare shoe. Made in all colors, in all sizes and for all style demountable rims and spare wheels.

Lamp Covers
Tool Box Covers
Trunk Covers
Radiator Covers

Inner Tube Bags
Knuckle Boots
Tire Locks
Tire Holders

bearing the name "Allen" are guaranteed highest quality and finest workmanship.

Tire Pressure Gauges

are a motoring necessity and all dealers should carry in stock the absolutely accurate and convenient

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TIRE PRESSURE GAUGE

The Allen Auto Specialty Co.
1926 Broadway New York
1627 Michigan Ave., Chicago.

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CASES (Continued)

TIRE AND TUBE CASES (Continued)

GILBERT Mfg. Co., New Haven, Conn. "Diamond."

GORDON—See Vehicle Apron & Hood Co.

HOPEWELL Bros., Newton, Mass. "Russell."
(See page 671.)

KEYSTONE—See Nathan Novelty Mfg. Co.

HOWARD—See Atlas Specialty Mfg. Co.

LANDERS Bros. Co., Toledo, O.
(See page 107.)

MERCHANT & Evans Co., Philadelphia, Pa. "Star."
(See page 135.)

NATHAN Novelty Mfg. Co., 906 Reade St., New York, N. Y. "Keystone," "Presto."
(See page 671.)

NIAGRA Auto-Cover Co., 524 W. 40th St., New York, N. Y. "Fitzwell."

OHIO Top Co., 909-11 Broadway, Cincinnati, O.

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

PRESTO—See Nathan Novelty Mfg. Co.

RUSSELL—See Hopewell Bros.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STAR—See Merchant & Evans Co.

TAYLOR Trunk Works, C. A., 89 E. Randolph St., Chicago, Ill.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

TOILET AND CARD CASES

BRIDGEPORT Coach Lace Co., 17th St. & Fourth Ave., New York, N. Y.

COWLES & Co., C., New Haven, Conn.
(See page 177.)

KRAFT & Sons, Theo., 458 W. Broadway, New York, N. Y.

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y.
(See page 217.)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

PARRY & Co., A. N., Amesbury, Mass.

PERPENTE Mfg. Co., State & Wall Sts., New Haven, Conn.

RUMPP & Sons, C. F., Fifth & Cherry Sts., Philadelphia, Pa.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

TOOL CASES

(See Bags, Tool; also Boxes, Tool)

CASTINGS

ALUMINUM CASTINGS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 245.)

ADLAKE—See Adams & Westlake Co.

ALLYNE—See Aluminum Castings Co.

ALUMINUM Castings Co., Cleveland, O. "Allyne."
(See page 109.)

AMERICAN Air Compressor Co., 1523-31 W. Fort St., Detroit, Mich.

AMERICAN Brass & Iron Co., Crystal St. & Trombley Ave., Detroit, Mich.

AMERICAN Bronze Co., 1415 Niagara St., Buffalo, N. Y.

AMERICAN Castings Co., Byrket St. & L. S. & M. S. Ry., Mishawaka, Ind.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATKINSON Co., Rochester, N. Y.
(See page 271.)

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

BRIDGEPORT Deoxidized Bronze & Metal Co., Bridgeport, Conn.

BUCKEYE Brass & Mfg. Co., 1307 Columbus Rd., Cleveland, O.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O.
(See page 111.)

CHAMPION Brass Works, Coldwater, Mich.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CITY Brass Foundry Co., 5310 St. Clair Ave., N. E., Cleveland, O.

CONESTOGA Job & Brass Foundry, 346 N. Christian St., Lancaster, Pa.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa.
(See page 269.)

D'ESTE Co., Julian, 24 Canal St., Boston, Mass.

DIAMOND Brass Foundry & Machine Co., 1115 Washington Blvd., Chicago, Ill.

DORCHESTER Brass & Aluminum Foundry, Old Sturtevant Bldg. (Jamaica Plain), Boston, Mass.

ERIE Specialty Co., 505 W. 12th St., Erie, Pa.

ESSEX Brass Foundry Co., Sixth & Harvard Sts., Cambridge, Mass.

EXETER Machine Works, Pittston, Pa.

FARIES Mfg. Co., Decatur, Ill.

FRIES & Co., Buffalo, N. Y.

FRONTIER Engineering Co., 816-36 Fort St., W. Detroit, Mich.

GENERAL Aluminum & Brass Mfg. Co., E. Grand Blvd. & St. Aubin Ave., Detroit, Mich.
(See pages 181 and 271.)

GENERAL Castings Co., Ford Bldg., Detroit, Mich.

GERMANN Bronze Co., Erie, Pa.

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Physical and Chemical Tests are made daily of the product of our plants by our Laboratories. If in doubt as to the alloy to be used write our

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New Kensington, Pa. Fairfield, Conn. Manitowoc, Wis.

The Aluminum Castings Co.

General Offices Cleveland, Ohio

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CASTINGS (Continued)

ALUMINUM CASTINGS (Continued)

GERSON-CAREY Co., Kalamazoo St. & L. S Ry., Lansing, Mich.

GRAHAM & Co., James, 293 Wooster St., (See page 343.)

HARLEY Co., Springfield, Mass. (See page 259.)

HOTZ Foundry & Mfg. Co., Fremont, O. (See page 547.)

HOWARD Metal Co., Second & Canal Sts., Reading, Pa.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

INDIANA Brass Co., 659 W. McClurg St., Frankfort, Ind.

JEFFERSON Brass Foundry, 209 King St., Brooklyn, N. Y.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

LEE Co., Wm. O., Port Huron, Mich. (See page 125.)

LEHIGH Valley Foundry & Mfg. Co., Easton, Pa. (See page 105.)

LIGHT Mfg. & Foundry Co., Pottstown, Pa. (See page 147.)

LIMERICK Co., J. Arthur, Howard St. & Park Ave., Baltimore, Md.

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass.

LUMEN Bearing Co., Buffalo, N. Y. (See page 321.)

McADAMITE—See United States McAdamite Metal Co.

McRAE Brass Mfg. Co., 611-19 W. Fort St., Detroit, Mich.

MACHINISTS Foundry Co., Muncie, Ind.

MILWAUKEE Aluminum & Brass Foundry Co., 295-97 Reed St., Milwaukee, Wis.

MURPHY-POTTER Co., Detroit, Mich.

NABRALCO—See National Bronze & Aluminum Foundry Co.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NATIONAL Bronze & Aluminum Foundry Co., 2539 E. 79th St., Cleveland, O. "Nabralco."

NORTH & Judd Mfg. Co., New Britain, Conn.

OBERDORFER Brass Co., M. L., 804 E. Water St., Syracuse, N. Y.

PARKER White Metal & Machine Co., 2217-23 Rail Road St., Erie, Pa.

PAULSON & Son, Thomas, 97 Second Ave., Brooklyn, N. Y. (See page 269.)

PIONEER Brass Works, Indianapolis, Ind. (See page 113.)

PROVIDENCE Brass & Aluminum Foundry, 460 Eddy St., Providence, R. I.

RACINE Aluminum & Brass Foundry Co., 1329 12th St., Racine, Wis.

RACINE Brass & Iron Co., 1327 Racine St., Racine, Wis.

REEVES & Co., Paul S., 1415-25 Catharine St., Philadelphia, Pa.

RINCON Foundry Co., 349-65 Seventh St., San Francisco, Cal.

ROSTAND Mfg. Co., Milford, Conn.

RUTENBER Motor Co., Marion, Ind. (See page 285.)

SAYRE Stamping Co., Sayre, Pa.

SHARP Brass Works, J. C., Boyce & 20th Sts., Chattanooga, Tenn.

SHERWOOD Brass Works, 1167 Jefferson Ave., Detroit, Mich.

SILVER Aluminum Metal Co., 294-96 Taaffe Pl., Brooklyn, N. Y.

STANDARD Brass Foundry Co., 1831 Columbus Rd., N. W., Cleveland, O.

STANDARD Brass & Iron Works, 1820 St. Paul Ave., Milwaukee, Wis.

STANDARD Foundry Co., Hartford, Conn.

TITAN Copper Products Co., Buffalo, N. Y.

TRIUMPH Electric Co. (Oakley), Cincinnati, O.

UNITED Foundry & Machine Co., Bridgeport, Conn. (See page 341.)

UNITED States McAdamite Metal Co., Isabella Ave. & E. St., Detroit, Mich. "McAdamite."

WAMBOLD Mfg. Co., 3011 Lisbon Ave., Milwaukee, Wis. (See page 303.)

WERRA Aluminum Foundry Co., Waukesha, Wis.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WILLIAMS & Son, E. A., Jersey City, N. J.

WISCONSIN Aluminum Foundry Co., Manitowoc, Wis.

BRONZE AND BRASS CASTINGS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O.

ADAMS & Westlake Co., Chicago, Ill. "Adlake." (See page 245.)

ADLAKE—See Adams & Westlake Co.

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALLYNE—See Aluminum Castings Co.

ALUMINUM Castings Co., Cleveland, O. "Allyne." (See page 109.)

AMERICAN Air Compressor Co., 1523-31 W. Fort St., Detroit, Mich.

AMERICAN Brass & Iron Co., Crystal St. & Trombley Ave., Detroit, Mich.

AMERICAN Bronze Co., 140-80 Non-Gran Blvd., Berwyn, Pa. (See page opposite inside front cover.)

AMERICAN Bronze Co., 1415 Niagara St., Buffalo, N. Y.

AMERICAN Car & Ship Hardware Mfg. Co., 2-4 Mechanic St., New Castle, Pa.

AMERICAN Castings Co., Byrket St. & L. S. & M. S. Ry., Mishawaka, Ind.

AMERICAN Manganese Bronze Co., 99 John St., New York, N. Y.

AMERICAN Pin Co., Waterbury, Conn.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ANDERSON Foundry Co., Wm. B., 24-30 S. Clinton St., Chicago, Ill.

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Aluminum Castings
of the Highest Grade

Transmission Cases
Crank Cases for Motor Cycles and Cycle Cars
Running Boards
Foot Boards
Vacuum Cleaner Castings
Electrical Drill Castings

Medium Sized Aluminum Castings of any description.

Our equipment for the production of this work is unexcelled—it was designed expressly for the production of *Medium Size Castings in Quantity* and the result is—

Superior Castings ***Reasonable Prices***
Satisfied Customers

The Bunting Brass & Bronze Co.
737 Spencer Street, TOLEDO, OHIO
925 Chamber of Commerce Bldg., DETROIT

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CASTINGS (Continued)

BRONZE AND BRASS CASTINGS (Continued)

ATKINSON Co., Rochester, N. Y. "Samson."
(See page 271.)

ATLAS Brass Foundry, 155 A St., Boston, Mass.

ATLAS Brass Foundry Co.,980-90 S. Front St., Columbus, O.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 341.)

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

BAY View Foundry Co., McDonough, Water & Shelby Sts., Sandusky, O.

BLAKE, Edwin J., 565 Windsor St., Hartford, Conn.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BRAINERD Mfg. Co., East Rochester, N. Y.

BRASS Foundry Co., 711-17 S. Adams St., Peoria, Ill.

BRIDGEPORT Deoxidized Bronze & Metal Co., Bridgeport, Conn.

BROWN Cotton Gin Co., 38 Pequot Ave., New London, Conn.

BUCKEYE Brass & Mfg. Co., 1807 Columbus Rd., Cleveland, O.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O.
(See page 111.)

CARTER, E. T., Plainville, Conn.

CENTRAL Brass Foundry, 105-07 S. Clinton St., Chicago, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHAMPION Brass Works, Coldwater, Mich.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CITY Brass Foundry Co., 5310 St. Clair Ave., N. E., Cleveland, O.

CONESTOGA Job & Brass Foundry, 246 N. Christian St., Lancaster, Pa.

CONSOLIDATED Casting Co., Mechanicsville, N. Y.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa.
(See page 269.)

DAMASCUS Bronze Co., Pittsburg, Pa.

DELTA—See Phosphor Bronze Smelting Co.

D'ESTE Co., Julian, 24 Canal St., Boston, Mass.

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich.

DIAMOND Brass Foundry & Machine Co., 1115 Washington Blvd., Chicago, Ill.

DORCHESTER Brass & Aluminum Foundry, Old Sturtevant Bldg. (Jamaica Plain), Boston, Mass.

EAGLE—See Stillman White Foundry Co.

EDNA Brass Mfg. Co., 525-33 Reading Rd., Cincinnati, O.

ELEPHANT—See Phosphor Bronze Smelting Co.

ELLSWORTH Brass Foundry Co., 249 R. R. Ave., Bridgeport, Conn.

ERIE Specialty Co., 505 W. 12th St., Erie, Pa.

ESSEX Brass Foundry Co., Sixth & Harvard Sts., Cambridge, Mass.

EUREKA Brass Co., 2210-18 Scott Ave., St. Louis, Mo.

EUREKA Co., North East, Pa.
(See page 273.)

EXETER Brass Works, Exeter, N. H.

EXETER Machine Works, Pittston, Pa.

FAIRVIEW Foundry Co., Detroit, Mich.

FARIES Mfg. Co., Decatur, Ill.

FORT Hill Bronze Mfg. Co., 48-56 Waters Ave., West Everett, Mass.

FRIES & Co., Buffalo, N. Y.

FRONTIER Engineering Co., 816-36 Fort St., W., Detroit, Mich.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 221.)

GAYLORD Co., F. L., Ansonia, Conn.

GENERAL Aluminum & Brass Mfg. Co., E. Grand Blvd. & St. Aubin Ave., Detroit, Mich.
(See pages 181 and 271.)

GENERAL Castings Co., Ford Bldg., Detroit, Mich.

GERMANN Bronze Co., Erie, Pa.

GERSON-CAREY Co., Kalamazoo St. & L. S Ry., Lansing, Mich.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn.
(See page 343.)

GREY Mfg. Co., C. M., East Orange, N. J.

HARLEY Co., Springfield, Mass.
(See page 259.)

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HERCULES Float Works, 200-10 Franklin St., Springfield, Mass.

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

HOTZ Foundry & Mfg. Co., Fremont, O.
(See page 547.)

HOWARD Metal Co., Second & Canal Sts., Reading, Pa.

IDEAL Bronze Co., 1265 E. 55th St., Cleveland, O.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

INDIANA Brass Co., 659 W. McClurg St., Frankfort, Ind.

INDIANAPOLIS Brass Co., 1012 E. Michigan St., Indianapolis, Ind.

IVES Co., H. B., 5-17 Artizan St., New Haven, Conn.

JEFFERSON Brass Foundry, 209 King St., Brooklyn, N. Y.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KELLS Foundry & Machine Co., East Gary, Ind.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

LANGSENKAMP-WHEELER Brass Works, 1206-28 Shelby St., Indianapolis, Ind.

LEE Co., Wm. O., Port Huron, Mich.
(See page 125.)

LEHIGH Valley Foundry & Mfg. Co., Easton, Pa.
(See page 105.)

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Automobile Castings

of the better grade in GUN METAL, ALUMINUM, PHOSPHOR BRONZE, or MANGANESE BRONZE.

We show more uniformity of metal and shape of castings than most foundries.

PIONEER Phosphor Bronze for Bearings has no equal.

Automobile Finished Parts

for machines where quality and accuracy are required.

We finish parts with less variation than most machine shops.

We furnish more vital parts for race cars than any ten other shops.

Pioneer Brass Works

Indianapolis, Indiana

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CASTINGS (Continued)

BRONZE AND BRASS CASTINGS (Continued)

LEVETT Co., W. M., Tenth Ave. & 36th St., New York, N. Y.

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 147.)

LIMERICK Co., J. Arthur, Howard St. & Park Ave., Baltimore, Md.

LITTAND Mfg. Co., Kenosha, Wis.

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass.

LUMEN Bearing Co., Buffalo, N. Y.
(See page 321.)

LUSK Bros., Foundry Co., 209-15 Van Buren St., Jackson, Mich.

McRAE Brass Mfg. Co., 611-19 W. Fort St., Detroit, Mich.

MACHINISTS Foundry Co., Muncie, Ind.

MEDINA Stamping & Machine Co., Medina, N. Y.

METROPOLITAN Mfg. Co., Detroit, Mich.

MILWAUKEE Aluminum & Brass Foundry Co., 295-97 Reed St., Milwaukee, Wis.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

MONUMENTAL Bronze Co., Bridgeport, Conn.

MUELLER Metal Co., 288 Dyer St., Providence, R. I.

MURPHY-POTTER Co., Detroit, Mich.

NABRALCO—See National Bronze & Aluminum Foundry Co.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NATIONAL Bronze & Aluminum Foundry Co., 2539 E. 79th St., Cleveland, O. "Nabralco."

NOLTE Brass Co., 27-29 W. Jefferson St., Springfield, O.

NORTH & Judd Mfg. Co., New Britain, Conn.

NORWALK Brass Co., Mechanic St., Norwalk, Conn.

OBERDORFER Brass Co., M. L., 804 E. Water St., Syracuse, N. Y.

ONONDAGA Brass Co., Decker & Brown Sts., Syracuse, N. Y.

PARKER White Metal & Machine Co., 2217-23 Rail Road St., Erie, Pa.

PAULSON & Son, Thomas, 97 Second Ave., Brooklyn, N. Y.
(See page 269.)

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant," "Delta."
(See page 549.)

PIONEER Brass Works, Indianapolis, Ind.
(See page 113.)

PITTSBURG Brass Mfg. Co., 32d St. & Penn Ave., Pittsburg, Pa.

PROGRESSIVE Brass Foundry, Keowee & Herbert Sts., Dayton, O.

PROVIDENCE Brass & Aluminum Foundry, 460 Eddy St., Providence, R. I.

RACINE Aluminum & Brass Foundry Co., 1329 12th St., Racine, Wis.

REEVES & Co., Paul S., 1415-25 Catharine St., Philadelphia, Pa.

RIDER-BAGG Co., 369 Birnie Ave., Springfield, Mass.

RINCON Foundry Co., 349-65 Seventh St., San Francisco, Cal.

ROSTAND Mfg. Co., Milford, Conn.

RUTENBER Motor Co., Marion, Ind.
(See page 285.)

SAMSON—See Atkinson Co.

SAYRE Stamping Co., Sayre, Pa.

SHARP Brass Works, J. C., Boyce & 20th Sts., Chattanooga, Tenn.

SHERWOOD Brass Works, 1167 Jefferson Ave., Detroit, Mich.

SPENCER'S Sons, I. S., Guilford, Conn.

STANDARD Brass Foundry Co., 1831 Columbus Rd., N. W., Cleveland, O.

STANDARD Brass & Iron Works, 1820 St. Paul Ave., Milwaukee, Wis.

STANDARD Foundry Co., Hartford, Conn.

STILLMAN White Foundry Co., 1 Bark St., Providence, R. I. "Eagle."

THIERY & Kendrick Mfg. Co., 660-64 Franklin St., Detroit, Mich.

TITAN Copper Products Co., Buffalo, N. Y.

TRIUMPH Electric Co. (Oakley), Cincinnati, O.

TURNER & Seymour Mfg. Co., Torrington, Conn.

UNIQUE Brass Foundry Co., 25 Illinois St., Buffalo, N. Y.

UNITED Foundry & Machine Co., Bridgeport, Conn.
(See page 341.)

VANADIUM Metals Co., Vanadium Bldg., Pittsburg, Pa. "Victor."
(See page 499.)

VICTOR—See Vanadium Metals Co.

WAMBOLD Mfg. Co., 3011 Lisbon Ave., Milwaukee, Wis.
(See page 303.)

WAUKESHA Foundry Co., Waukesha, Wis.

WATERBURY Mfg. Co., Waterbury, Conn.

WELLMAN Bronze Co., 6017 Superior Ave., Cleveland, O.

WELLS Chemical Bronze Works, 219 Summer St., Worcester, Mass.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

WILLIAMS & Son, E. A., Jersey City, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

YOUNGSTOWN Brass & Aluminum Co., 722 W. Madison Ave., Youngstown, O.

DIE CASTINGS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O.

ALEMITE Metals Co., 214-20 N. Carpenter St., Chicago, Ill.

AMERICAN Die Casting Co., Vandalia Tracks & White River, Indianapolis, Ind.
(See page 531.)

Complete Index to Classification appears on Pages 8 to 22.

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FRANKLIN DIE-CAST PARTS

Are Standard for Quality

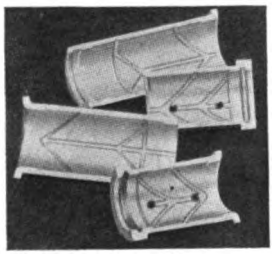
Franklin Manufacturing Company. Home of Franklin Die Cast Parts

The advantages of die casting over the usual forms of machining have become a recognized fact. A die once constructed insures for all time a degree of accuracy and uniformity difficult to secure except through expensive machine operations, at the same time eliminating the necessity of costly machine equipment. This is of special advantage in the development of new inventions or the meeting of rapidly increasing demands.

The Franklin Manufacturing Company are the pioneers in the die casting industry.

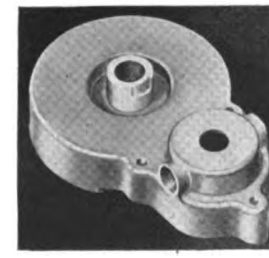
Their process and equipment are the result of twenty years of development.

The Franklin factory affords ample facilities for the meeting of your die casting requirements.



Franklin quality is the best guarantee of satisfaction.

Booklet B, describing the Franklin process and its results, should prove of value to all interested in cost reduction.



FRANKLIN MANUFACTURING COMPANY

401 South Geddes Street Syracuse, N. Y.

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CASTINGS (Continued)

DIE CASTINGS (Continued)

AMERICAN Die Casting Co., 275-83 Kent Ave., Brooklyn, N. Y.

ATLAS Die Casting Co., 107 N. Franklin St., Syracuse, N. Y.

BLISS Co., E. W., Brooklyn, N. Y.

DOEHLER Die-Casting Co., Brooklyn, N. Y.
(See page 117.)

FINISHED Parts Mfg. Co., 359 Mulberry St., Newark, N. J.

FRANKLIN Mfg. Co., 401 S. Geddes St., Syracuse, N. Y.
(See page 115.)

GERMANN Bronze Co., Erie, Pa.

GREY Mfg. Co., C. M., East Orange, N. J.

HOYT Metal Co., 700 Merchants-Laclede Bldg., St. Louis, Mo.
(See page 271.)

INDIANA Die Casting Development Co., 311-17 McGill St., Indianapolis, Ind.

KIDDER-OSWALD Co., Dayton, O.

LEGLER-EILERMAN Co., Bacon St., Dayton, O.

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 147.)

LUMEN Bearing Co., Buffalo, N. Y.
(See page 321.)

MILWAUKEE Die Casting Co., Manufacturers Home Bldg., Milwaukee, Wis.
(See page 117.)

MOBERG, C. J., 118 Pearl St., Mt. Vernon, N. Y.

MODERN Die & Tool Co., 202-04 S. Penn St., Indianapolis, Ind.

MOGUL Metal Co., Detroit, Mich.
(See page 125.)

MUZZY-LYON Co., Detroit, Mich.
(See page 125.)

NATIONAL Lead Co., New York, N. Y.
(See page 291.)

PARKER White Metal & Machine Co., 2217-23 Rail Road St., Erie, Pa.

PHOENIX Die Casting Co., 21 Illinois St., Buffalo, N. Y.

PRECISION Die-Casting Co., Syracuse, N. Y.
(See page 567.)

SANFORD Co., David C., 33-39 Tulip St., Bridgeport, Conn.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 305.)

STEWART Mfg. Co., J. H., Wells St. Bridge, Chicago, Ill.

STROH Die Moulded Casting Co., 163-73 Michigan St., Milwaukee, Wis.

SYRACUSE Die Moulded Casting Co., Syracuse, N. Y.

SYRACUSE Smelting Works, Drawer 48, Station G, Brooklyn, N. Y.
(See page 562.)

UNITED Foundry & Machine Co., Bridgeport, Conn.
(See page 341.)

VAN WAGNER Mfg. Co., E. B. Syracuse, N. Y.
(See page 119.)

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

WHITE Brass Casting Co., 1656 Austin Ave., Chicago, Ill.

WING & Co., J. T., 15-19 Woodward Ave., Detroit, Mich.

ZENITE Metal Co., 518 N. Capitol Ave., Indianapolis, Ind.

GRAY IRON CASTINGS

ACME Foundry Co., Detroit, Mich.

ADRIAN Steel Casting Co., Adrian, Mich.

AMERICAN Foundry & Mfg. Co., 11th & Herbert Sts., St. Louis, Mo.

ARNOLD Co., Hoyt St., Norwalk, Conn.

ATLAS Foundry Co., Military St., Detroit, Mich.

BALL Engine Co., Erie, Pa.

BARLOW Foundry Co., 28 Orange St., Newark, N. J.

BAY View Foundry Co., McDonough, Water & Shelby Sts., Sandusky, O.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BYRAM Foundry Co., 921 Biddle St., Indianapolis, Ind.

CAMPBELL, Wyant & Cannon Foundry Co., Muskegon, Mich.

CAPITOL Foundry Co., Hartford, Conn.

COLUMBIA Gray Iron Co., Second & Linden Sts., Columbia, Pa.

CONSOLIDATED Castings Co., Mechanicsville, N. Y.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa.
(See page 269.)

DEAN Mfg. Co., 262 Front St., Newport, Ky.

DETROIT Foundry Co., N. Grand Blvd. & Riopelle St., Detroit, Mich.

ELEVATOR Supply & Repair Co., 561 W. Monroe St., Chicago, Ill.

EMPIRE Foundry Co., Jersey Ave., New Brunswick, N. J.

EMPIRE Foundry Co., 203 Temple St., Syracuse, N. Y.

ENTERPRISE Foundry Co., 1127-57 E. Warren Ave., Detroit, Mich.

ERIE Foundry Co., 12th & Cranberry Sts., Erie, Pa.

FAIRVIEW Foundry Co., Detroit, Mich.

FANNER Mfg. Co., Brookside Pk., Cleveland O.

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.
(See pages 574 and 575.)

FRONTIER Iron Works, 41 Letchworth St., Buffalo, N. Y.

FULTON Foundry & Machine Co., 25 Furman St., Brooklyn, N. Y.

GREY Iron Castings Co., Mt. Joy, Pa.

HALL Gas Engine Mfg. Co., Byesville, O.

HART Foundry Co., 10 Allen St., Lawrence, Mass.

HOLYOKE Motor Foundry Co., Holyoke, Mass.

HOPSON & Chapin Mfg. Co., New London, Conn.

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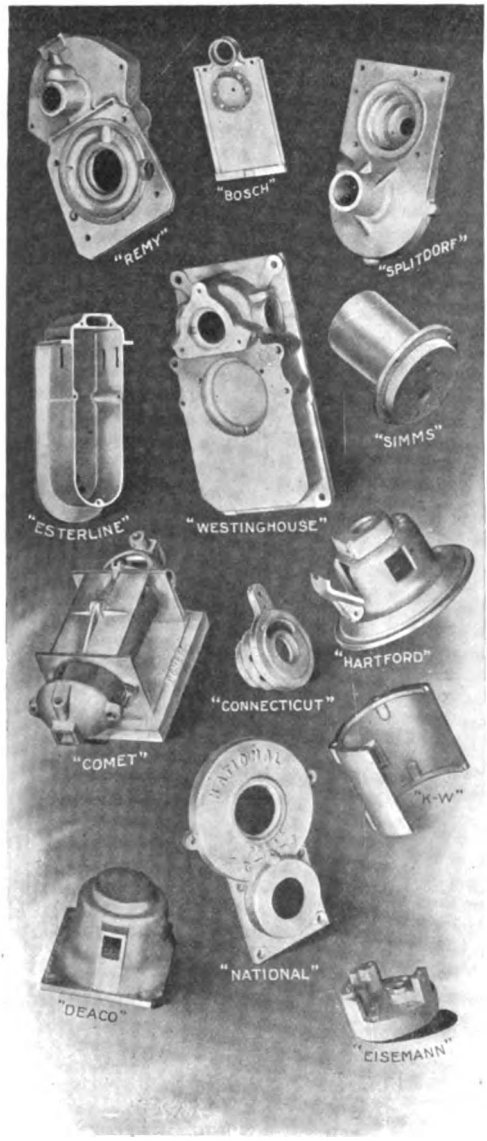

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CASTINGS (Continued)

GRAY IRON CASTINGS (Continued)

HUBLEY Mfg. Co., Lancaster, Pa.

INTERSTATE Foundry Co., E. 61st St. & Erie R. R., Cleveland, O.

KELLS Foundry & Machine Co., East Gary, Ind.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

LOVEWELL-HENRICI Co., 986-42 Broadway, Chelsea, Mass.

LUSK Bros., Foundry Co., 209-15 Van Buren St., Jackson, Mich.

LYCOMING Foundry & Machine Co., Williamsport, Pa.
(See page 445.)

McFARLAND Foundry & Machine Co., Trenton, N. J.

MACHINISTS Foundry Co., Muncie, Ind.

MANUFACTURERS Foundry Co., Waterbury, Conn.
(See page 301.)

MOHN & Kershner, Green St., Reading, Pa.

MOTOR Foundry Co., Detroit, Mich.

MUNCIE Foundry & Machine Co., Muncie, Ind.
(See page 539.)

NATIONAL Sewing Machine Co., Belvidere, Ill.

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis.

PALMER & De Mooy Foundry Co., 1658 Leonard St., Cleveland, O.

PEQUONNOCK Foundry, Fifth St. Extension, Bridgeport, Conn.

PORTLAND Foundry & Machine Co., Portland, Ind.

RACINE Brass & Iron Co., 1327 Racine St., Racine, Wis.

RACINE Foundry Co., Tenth St. & C., M. & St. P. Ry., Racine, Wis.

REEDY Foundry Co., 4600 Iowa St., Chicago, Ill.

RELIANCE Foundry Co., Richmond, Ind.

RINCON Foundry Co., 349-65 Seventh St., San Francisco, Cal.

RUTENBER Motor Co., Marion, Ind.
(See page 285.)

SEAGER Engine Works, Lansing, Mich.

SMITH Mfg. Co., Philip, Sidney, O.

SOWERS Mfg. Co., 1300-10 Niagara St., Buffalo, N. Y.

SPENCER'S Sons, I. S., Guilford, Conn.

STANDARD Foundry Co., Forest & Kewaunee Sts., Racine, Wis.

STOWELL Mfg. & Foundry Co., South Milwaukee, Wis.

SUSQUEHANNA Casting Co., Wrightsville, Pa.

SWEET & Doyle Foundry & Machine Co. (Greene Island), Albany, N. Y.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

TURNER & Seymour Mfg. Co., Torrington, Conn.

UNION Mfg. Co., New Britain, Conn.

URICK Foundry Co., 15th & Cherry Sts., Erie, Pa.

WABASH Foundry & Machine Co., Wabash, Ind.

WALKER Foundry Co., Erie, Pa.

WATERBURY Castings Co., R. R. Hill, Waterbury, Conn.

WAYNE Works, 16th & F. Sts., Richmond, Ind.

WEST Side Foundry Co., Watervliet, N. Y.

WESTINGHOUSE Machine Co. (E. Pittsburg), Pittsburg, Pa.

MALLEABLE IRON CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Rd., Buffalo, N. Y.

ALBION Malleable Iron Co., Albion, Mich.

AMERICAN Malleables Co., Lancaster, N. Y.

ARCADE Malleable Iron Co., Worcester, Mass.

BADGER Malleable & Mfg. Co., South Milwaukee, Wis.

BARLOW Foundry Co., 28 Orange St., Newark, N. J.

BELLE City Malleable Iron Co., Kewaukee Ave., Racine, Wis.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BUHL Malleable Iron Co., Detroit, Mich.

CHISHOLM & Moore Mfg. Co., Lakeside Ave. & E. 49th St., Cleveland, O.

COLUMBUS Malleable Iron Co., Curtis Ave., Columbus, O.

DAYTON Malleable Iron Co., Dayton, O.

EASTERN Malleable Iron Co., Naugatuck, Conn.

ERIE Malleable Iron Co., Cherry St., & E. P. R. R., Erie, Pa.

FANNER Mfg. Co., Brookside Pk., Cleveland, O.

FLAGG & Co., Stanley G., 1421 Chestnut St., Philadelphia, Pa.

FRAZER & Jones Co., Syracuse, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 221.)

GENERAL Malleable Co., Warren, O.

GLOBE Malleable Iron & Steel Co., Syracuse, N. Y.
(See page 123.)

ILLINOIS Malleable Iron Co., 1801-25 Diversey Blvd., Chicago, Ill.

JEWEL Steel & Malleable Co., 373 Hertel Ave., Buffalo, N. Y.

JOHNSON & Co., Isaac G., Spuyten Duyvil, New York, N. Y.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

MALLEABLE Iron Fittings Co., Branford, Conn.
(See page 477.)

MARION Malleable Iron Works, Marion, Ind.

MEEKER Foundry Co., 95 Clay St., Newark, N. J.

MOLINE Malleable Iron Co., St. Charles, Ill.

NATIONAL Malleable Castings Co., Cleveland, O.
(See pages 121 and 122.)

NORTH & Judd Mfg. Co., New Britain, Conn.

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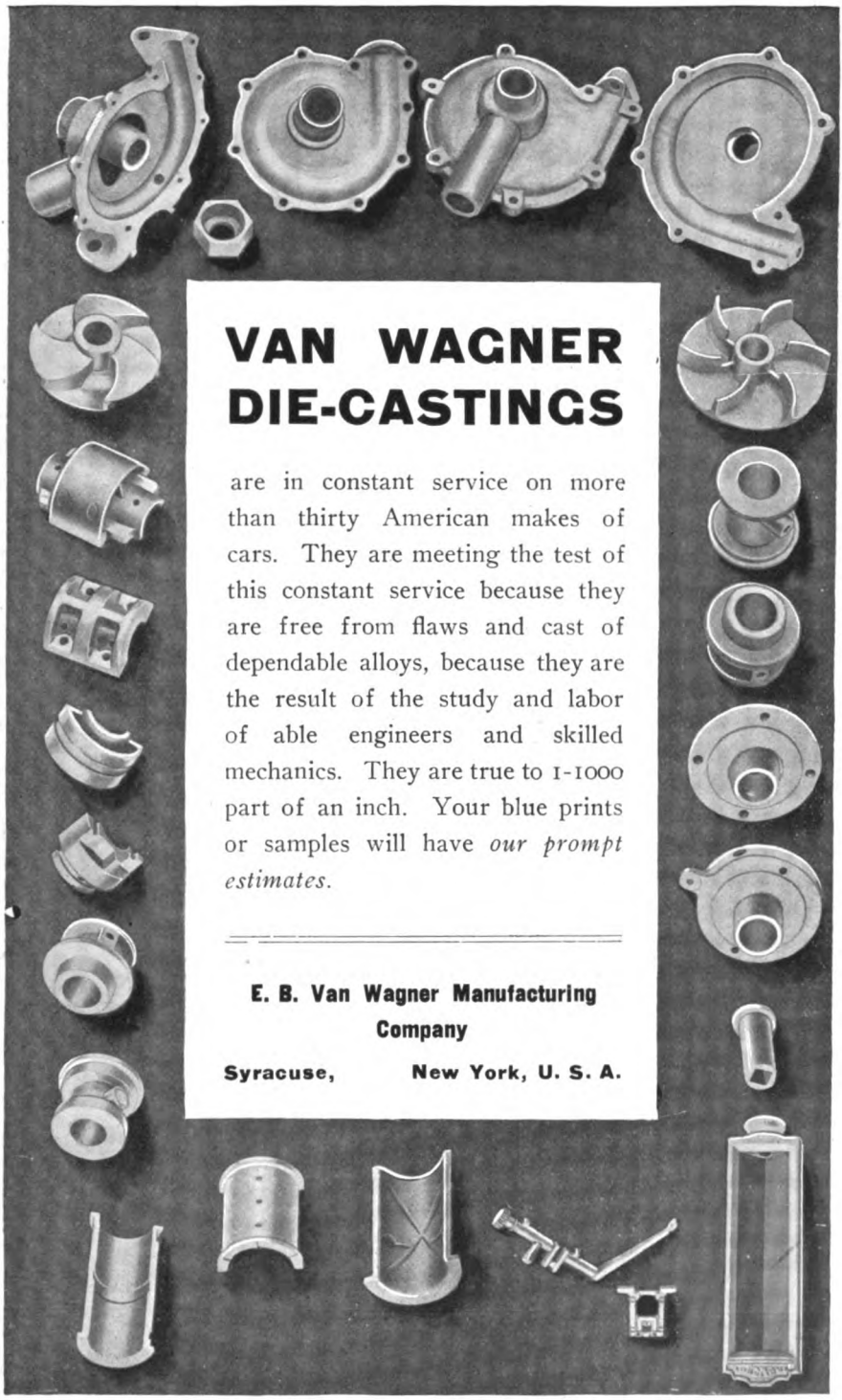

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CASTINGS (Continued)

MALLEABLE IRON CASTINGS (Continued)

OHIO Malleable Iron Co., Columbus, O. **(See page 125.)**

ORISKANY Malleable Iron Co., Oriskany, N. Y.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill.

PRATT & Letchworth Co., 189 Tonawanda St., Buffalo, N. Y.

RHODE Island Malleable Iron Works, Hills Grove, R. I.

SPRINGFIELD Malleable Iron Co., George St., Springfield, O.

STOWELL Mfg. & Foundry Co., South Milwaukee, Wis.

SYRACUSE Malleable Iron Works, Syracuse, N. Y. **(See page 503.)**

TERRE Haute Malleable & Mfg. Co., N. 19th St., Terre Haute, Ind.

TRENTON Malleable Iron Co., New York Ave., Trenton, N. J.

UNITED States Malleable Iron Co., Woodville St., Toledo, O.

STEEL CASTINGS

ACME Steel & Malleable Iron Works, 245 Military Rd., Buffalo, N. Y.

ADRIAN Steel Castings Co., Adrian, Mich.

BALDWIN Steel Co., Charleston, W. Va.

BESCO—See Buchanan Electric Steel Co.

BETHLEHEM Steel Co., Third & Poplar Sts., South Bethlehem, Pa.

BOSTON Casting Co., 12 Pearl St., Boston, Mass.

BUCHANAN Electric Steel Co., Buchanan, Mich. "Besco."

BUHL Malleable Iron Co., Detroit, Mich.

CARPENTER Steel Co., Reading, Pa.

CHESTER Steel Castings Co., Chester, Pa.

CHICAGO Steel Foundry Co., Kedzie Ave. & 37th St., Chicago, Ill.

CINCINNATI Steel Castings Co., Queen City & Spring Grove Aves., Cincinnati, O.

CRUCIBLE Steel Casting Co., Lansdowne, Pa.

CRUCIBLE Steel Castings Co., 612 Clinton St., Milwaukee, Wis.

DAMASCUS Crucible Steel Casting Co., New Brighton, Pa.

DAYTON Steel Foundry Co., Dayton, O.

EAGAN-ROGERS Steel & Iron Co., Crum Lynne, Pa.

EASTERN Steel Castings Co., 30 Kemble St., Boston, Mass.

FARRELL-CHEEK Steel Foundry Co., Sandusky, O.

FIRTH & Son Co., Rowland, Phillipsburg, N. J.

FISCHER Steel & Iron Works, Ltd., Geo., Schaffhausen, Switzerland. **(See page 515.)**

FLAGG & Co., Stanley G., 1421 Chestnut St., Philadelphia, Pa.

FORT Pitt Steel Casting Co., McKeesport, Pa.

GERLINGER Steel Casting Co., 59th St. & National Ave., West Allis, Wis.

HESS Steel Castings Co., Bridgeton Ave. & C. R. R. of N. J., Bridgeton, N. J.

INLAND Steel Casting Co., Terra Haute, Ind.

JEWEL Steel & Malleable Co., 378 Hertel Ave., Buffalo, N. Y.

JOHNSON & Co., Isaac G., Spuyten Duyvil, New York, N. Y.

KEYSTONE Steel Casting Co., Chester, Pa.

KRUPP—See Prosser & Son.

LEBANON Steel Foundry, Lebanon, Pa.

LIVERMORE, Homer F., 81 Pearl St., Boston, Mass.

MALLEABLE Iron Fittings Co., Branford, Conn. **(See page 477.)**

MAYNARD Steel Casting Co., 710-16 Reed St., Milwaukee, Wis.

MICHIGAN Steel Casting Co., Detroit, Mich. **(See page 123.)**

MILBURY Steel Foundry Co., Milbury, Mass.

MILWAUKEE Steel Foundry Co., S. Water & Virginia Sts., Milwaukee, Wis.

NATIONAL Malleable Castings Co., Cleveland, O. **(See pages 121 and 122.)**

NATIONAL Steel Casting Co., Montpelier, Ind.

PENINSULAR Steel Castings Co., Iron & Wight Sts., Detroit, Mich.

PENN Steel Castings & Machine Co., Chester, Pa.

PRATT & Letchworth Co., 189 Tonawanda St., Buffalo, N. Y.

PRIME Steel Co., Milwaukee, Wis.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." **(See page 395.)**

RACINE Steel Castings Co., Racine, Wis.

REED Foundry & Machine Co., Kalamazoo, Mich.

RIVERSIDE Steel Casting Co., Newark, N. J. **(See page 181.)**

SMITH Steel Castings Co., Geo. H., 500 Clinton St., Milwaukee, Wis.

STANDARD Steel Castings Co., Cleveland, O.

STOCK Process Steel Co., Detroit, Mich.

STRONG Steel Foundry Co., Hertel Ave. & Norris St., Buffalo, N. Y.

SWEDISH Crucible Steel Co. (Hamtramck), Detroit, Mich. **(See page 495.)**

TAYLOR-WHARTON Iron & Steel Co., High Bridge, N. J.

TECO—See Treadwell Engineering Co.

TOLEDO Steel Casting Co., Toledo, O.

TREADWELL Engineering Co., Easton, Pa. "Teco."

UNION Steel Casting Co., Bartlett Sq. (Jamaica Plain), Boston, Mass.

WARREN Steel Casting Co., Lyon & Dorcas Sts., St. Louis, Mo.

WEHR Steel Co., 45th & Gordon Aves., West Allis, Wis.

WEST Steel Casting Co., 805-13 E. 79th St., Cleveland, O.

WHITELEY Steel Co., 108½ Jefferson St., Muncie, Ind.

WHITMAN Co., A. P., Fourth & Booth Sts., Chester, Pa.

Complete Index to Classification appears on Pages 8 to 22.

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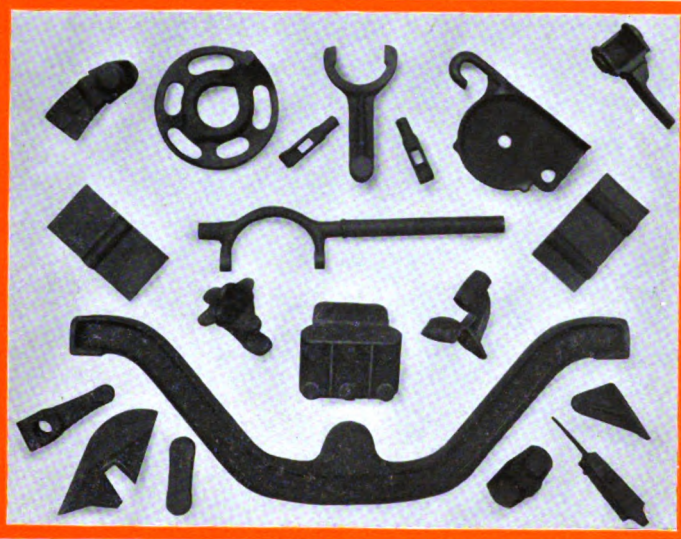
For Automobile Parts



No Segregation
No Oxides
Low Sulphur
Absolute Uniformity
High Elastic Limit
Great Resistance to Fatigue

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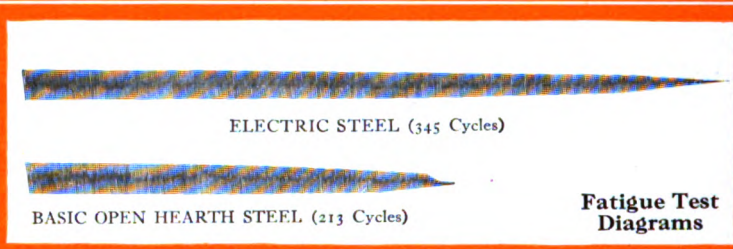

Fatigue Test Diagrams

The above diagrams are exact reproductions (reduced) from two tests which are typical of a large number made for us on an UPTON-LEWIS TOUGHNESS TESTING MACHINE by the TINIUS OLSEN TESTING MACHINE CO., upon two similarly annealed specimens of our steel—one of ELECTRIC and the other BASIC OPEN HEARTH, of almost identical analysis (except sulphur).

The Electric Steel specimens showed a marked superiority throughout all the tests, especially as to *toughness*, *resistance to fatigue*, *elongation* and *reduction of area*.

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SHARON, PA. MELROSE PARK, ILL.

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DETROIT, MICHIGAN

We Make Only the Highest Grade of True Steel Castings

F. I. A. T. Fly-wheel.
Blades taper from ¼″ to ⅛″ in thickness.

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Manufacturers of

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We are manufacturers of strictly high-grade products; all mixtures in our Malleable Department are made by scientific methods. Our castings are unsurpassed for uniformity. We have had years of experience in manufacturing castings for the largest automobile and automobile part manufacturers in the United States. All steels in our Forge Department are analyzed in our own laboratories, thus insuring you of forgings to your specifications. Pattern work a specialty. Prompt and efficient service our watchword. Send us samples or blue prints for estimates.

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CASTORS AND WHEEL TRUCKS

(See also Turntables, Automobile)

AUTO. & Accessories Mfg. Co., 816 W. North Ave., Baltimore, Md. "Norwood."

NORWOOD—See Auto. & Accessories Mfg. Co.

WEBER Cycle & Supply Co., 6 E. Kiowa St., Colorado Springs, Colo.

CATCHES

SPRING CABINET CATCHES AND FASTENERS

BRASS Goods Mfg. Co., 280 Nevins St., Brooklyn, N. Y.

CORBIN Cabinet Lock Co., New Britain, Conn.

READING Hardware Co., 630 S. Sixth St., Reading, Pa.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

CELLULOID

SHEET CELLULOID

(For windows in curtains and storm fronts)

ARLINGTON Co., 725-27 Broadway, New York, N. Y. "Pyralin."
(See page 181.)

CELLULOID Co., 30 Washington Pl., New York, N. Y.

FIBERLOID Co., 55 Fifth Ave., New York, N. Y.

PYRALIN—See Arlington Co.

CEMENT

CAST IRON CEMENT

(For repairing cracks in castings)

BRAND Co., S. H., 1259 W. Lake St., Chicago, Ill.

C-MEND-UM—See Central Foundry Supply Co.

CENTRAL Foundry Supply Co., St. Clair Ave. & P. R. R., Columbus, O. "C-Mend-Um."

CLARK Cast Steel Cement Co., Shelton, Conn. "Steamtite."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 521.)

SHANAFELT Mfg. Co., Canton, O. "X-Cel-All."

SMOOTH-ON Mfg. Co., 572-74 Communipaw Ave., Jersey City, N. J.

STEAMTITE—See Clark Cast Steel Cement Co.

X-CEL-ALL—See Shanafelt Mfg. Co.

RADIATOR REPAIR CEMENT

BLUE RIBBON—See International Metal Polish Co.

DAYTON Inner-Tire & Mfg. Co., 17 N. Madison St., Dayton, O.

DIAMOND Specialty Co., Indianapolis, Ind.
(See page 317.)

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HOWELL & Co., 648-50 N. Robey St., Chicago, Ill. "Perfection."

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

J-M Leak-No—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M "Leak-No."

JONES Auto Supply Co., 20th St. & Telegraph Ave., Oakland, Cal. "Stop-A-Leak."

LEAK-NO-MORE—See Van Tilburg Oil Co.

LUBRO Oil Co., 116 Prospect Ave., N. W., Cleveland, O.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis.
(See page 507.)

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

NORTHWESTERN Chemical Co., Marietta, O. "Se-Ment-Ol."
(See pages 143 and 551.)

PERFECTION—See Howell & Co.

RADIATOR Fix Co., Boston, Mass.

RADICO Mfg. Co., Springfield, Mass.
(See page 533.)

RIE-NIE—See Durkee-Atwood Co.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y. "Sta-Fix."

SACKETT Supply Co., Des Moines, Ia.

SE-MENT-OL—See Northwestern Chemical Co.

STA-FIX—See Rub-On Mfg. Co.

STOP-A-LEAK—See Jones Auto Supply Co.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Leak-no-More."

WONDER WORKER—See Hall-Thompson Co.

Z & A Mfg. Co., Hazelton, N. Dak.

TIRE REPAIR CEMENT

ACME Supply Co., Ionia, Mich.

American Tire & Rubber Co., 70-78 Beach St., Akron, O. "Stickfast."

ANCHOR—See National Cement & Rubber Co.

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill.

ATLAS Auto Supply Co., 95 E. Adams St., Chicago, Ill. "Tire-Doh."
(See page 149.)

BESTYET—See St. Louis Rubber Cement Co.

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Finished

BUSHINGS

Brass and Bronze Aluminum Crank Cases

All material first class and fully guaranteed.

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Intricate parts, such as **Bearings, Gears, Levers, Pumps,** Etc. cast accurately to size finished ready for assembling.

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Detroit, Mich.

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Ohio Malleable Iron Co.,
Columbus, Ohio

Capacity, 75 to 100 tons of reliable castings daily.

Quality—Our castings combine the *Ductility* of wrought iron, the *Accuracy* of drop forgings and *Strength* of cast steel.

Co-operation Our aim is to become your malleable department, to rush deliveries, to understand your shop practice and adapt our product to it.

Prove what this service can mean to you. There is nothing so convincing as a test from your own patterns so

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CEMENT (Continued)

TIRE REPAIR CEMENT (Continued)

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Premium."

BROOKLYN Rubber Co., 397 Summer Ave., Brooklyn, N. Y.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

COX, David H., Chestnut St., Roselle, N. J.

DIAMOND Rubber Co., Akron, O. "Titan." "Seal-Tite."

DUTCH—See Van Cleef Bros.

DYKES Co., John L. G., 222 N. State St., Chicago, Ill.

EUREKA Cement Co., 2-6 Ave. A., Newark, N. J.

EVER RIGHT—See Fry, Keyser.

FRY, Keyser, 616-22 N. Eighth St., Reading, Pa. "Ever Right."

GEM City Liquid Vulcanizer Co., 1021 E. Third St., Dayton, O. "U-Vulk."

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HAZEN-BROWN Co., Court St., Brockton, Mass. "Hazenoid."

HAZENOID—See Hazen-Brown Co.

HOOD Rubber Co., Watertown, Mass.

K-C—See Western Tire & Rubber Co.

K & W Rubber Co., Orange St., Ashland, O.
(See page 371.)

M. & M. Co., 414 Prospect Ave., Cleveland, O.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Tire & Rubber Co., Mansfield, O.

MICHELIN Tire Co., Milltown, N. J.

NAM-TAY—See Yatman Rubber Co.

NARCO—See National Rubber Co.

NATIONAL Cement & Rubber Co., 341 S. St. Clair St., Toledo, O. "Red Cross," "Anchor," "Pioneer."

NATIONAL RUBBER CO., 4409 Papin St., St. Louis, Mo. "Narco."
(See page 543.)

P. P. & B.—See St. Louis Rubber Cement Co.

PAGE-LESTER Co., 125 W. Van Buren St., Chicago, Ill.

PARKS Co., F. B., 23 Prescott St., Grand Rapids, Mich.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PIONEER—See National Cement & Rubber Co.

PREMIUM—See Blue Ribbon Mfg. Co.

RED CROSS—See National Cement & Rubber Co.

RELIABLE Cement Co. (E. Akron), Akron, O.

REPUBLIC Rubber Co., Youngstown, O.

RUBBER Goods Supply & Mfg. Co., Akron, O.

RUBBERSET Co., 56 Ferry St., Newark, N. J.

S. H. Mfg. Co., 1761 Broadway, New York, N. Y.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "P. P. & B." "Best-yet."

SEAL-TITE—See Diamond Rubber Co.

SEAMLESS Rubber Co., New Haven, Conn.

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

SIN-TI Rubber Co., Home Life Bldg., Washington, D. C.

STANDARD Rubber & Cable Co., Bridgeport, Conn. "Vulco."

STICKFAST—See American Tire & Rubber Co.

TINGLEY & Co., Chas. O., Rahway, N. J.

TIRE-DOH—See Atlas Auto Supply Co.

TITAN—See Diamond Rubber Co.

U-VULK—See Gem City Vulcanizer Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VAN Cleef Bros., 7709-11 Woodlawn Ave., Chicago, Ill. "Dutch."

VULCO—See Standard Rubber & Cable Co.

WESTERN Tire & Rubber Co., 17th St. & Grand Ave., Kansas City, Mo. "K-C."

YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J. "Nam-tay."

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J.

CHAIN

TRANSMISSION OR DRIVING CHAIN

AMERICAN High Speed Chain Co., Indianapolis, Ind.
(See page 361.)

BALDWIN Chain & Mfg. Co., Worcester, Mass.
(See page 169.)

BRAMPTON—See Miller, Chas. E.

COVENTRY—See Funke Co.

CULVER-TAYLOR Chain Works, 140 Madison Ave., Detroit, Mich.

DIAMOND Chain & Mfg. Co., Indianapolis, Ind.
(See page 127.)

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Renold."
(See page 589.)

FUNKE Co., Herbert F. L., 118 Broad St., New York, N. Y. (Importers.) "Coventry."
(See page 521.)

LINK-BELT Co., Indianapolis, Ind.
(See page 431.)

MILLER, Chas. E., 97 Reade St., New York, N. Y. (Importer.) "Brampton."

MORSE Chain Co., Ithaca, N. Y.

RENOLD—See Frasse & Co.

WHITNEY Mfg. Co., Hartford, Conn.
(See page 655.)

CHAINS

NON-SKID CHAINS OR GRIPS

(For other Anti-Skid Devices—See Bands, Non-Skip; also Treads, Detachable)

BRO-GOR—See Brockett-Gorham Co.

BROCKETT-GORHAM Co., Marion, O. "Bro-Gor."

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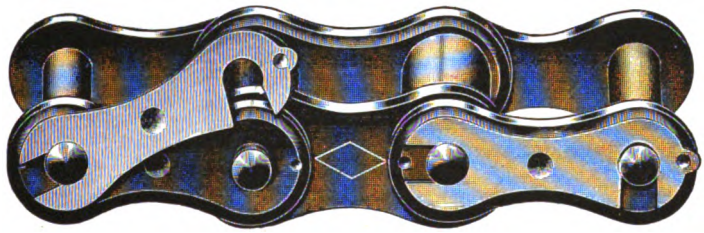

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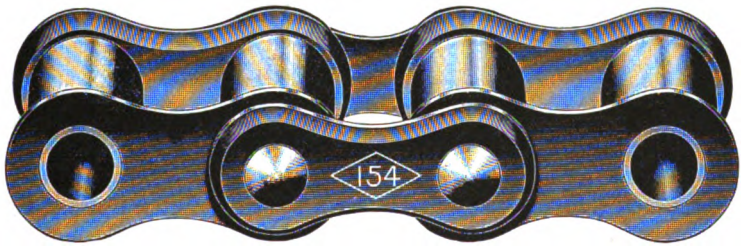

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The choice of truck users that insist on dependable service.

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ON EVERY LINK

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Indianapolis, Indiana.

CAPACITY, 8,000,000 FEET PER YEAR

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CHAINS (Continued)

NON-SKID CHAINS OR GRIPS (Continued)

EMERGENCY—See Garage Equipment Mfg. Co.

EUREKA Non-Skid Mfg. Co., 591 Bergen St., Brooklyn, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Emergency." (See page 221.)

HOOVER Co., W. H., New Berlin, O.

McKINNON Chain Co., 250 Amherst St., Buffalo, N. Y.

NEVER-SKID Mfg. Co., 794-98 Tenth Ave., New York, N. Y. (See page 131.)

WEED Chain Tire Grip Co., 28 Moore St., New York, N. Y. (See page 129.)

CHANNELS

PRESSED STEEL CHANNELS

(See Frames, Pressed Steel)

CHECKS

STEERING GEAR CHECKS

BARKER, W. A., 20-22 S. Hoyne Ave., Chicago, Ill.

LITTLE STEERSMAN—See Modern Auto Appliance Co.

MODERN Auto Appliance Co., Chatham, N. Y. "Little Steersman." (See page 543.)

CLAMPS

HOSE CLAMPS

ALLEN Mfg. Co., W. D., 135 W. Lake St., Chicago, Ill. "Bull Dog."

AMERICAN Stamping Co., Battle Creek, Mich.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BEAUDETTE & Co., R. A., Chippewa Falls, Wis.

BULL DOG—See Allen Mfg. Co.

CATELAIN, A., 1446-48 Indiana Ave., Chicago, Ill. (See page 131.)

ERICKSON & Son, P. E., Port Chester, N. Y. (See page 361.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

HERZ & Co., New York, N. Y. (See page 599.)

HUDSON Hose Mender Co., Melrose, Mass.

IDEAL Clamp Mfg. Co., 77 Jamaica Ave., Brooklyn, N. Y.

LAVIGNE—See Magnus Co.

MAGNUS Co., Detroit, Mich. "Lavigne."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MORGAN, B., John St., Newport, R. I.

NEWARK Stamping Co., Newark, O. "Thompson." (See page 423.)

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y. (See page 443.)

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

THOMPSON—See Newark Stamping Co.

SPRING REPAIR CLAMPS

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

ECONOMY—See Walker-Moore Mfg. Co.

KANTALEVER—See Motor Car Equipment Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. "Kantalever."

WALKER-MOORE Mfg. Co., 310 Walker St., Racine, Wis. "Economy."

WIRE ROPE CLAMPS

BRODERICK & Bascom Rope Co., 805 N. Second St., St. Louis, Mo. (See page 355.)

BULL DOG—See Lamson & Sessions Co.

HAZARD Mfg. Co., Wilkes-Barre, Pa.

LAMSON & Sessions Co., 2133 Scranton Rd., Cleveland, O. "Bull Dog."

LANZ & Sons, Mathew, 2907 Carson St., Pittsburgh, Pa.

LESCHEN & Sons Rope Co., A., 920 N. First St., St. Louis, Mo.

MACOMBER & Whyte Rope Co., 507-09 S. Clinton St., Chicago, Ill.

ROEBLINGS Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

CLEANERS

ACETYLENE BURNER CLEANERS

BARNARD Specialty Co., 3300 Maple Ave., Los Angeles, Cal.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

GLASS WIND SHIELD CLEANERS

BACHER—See B. & B. Mfg. Co.

B. & B. Mfg. Co., 6526 Carnegie Ave., Cleveland, O. "Bacher."

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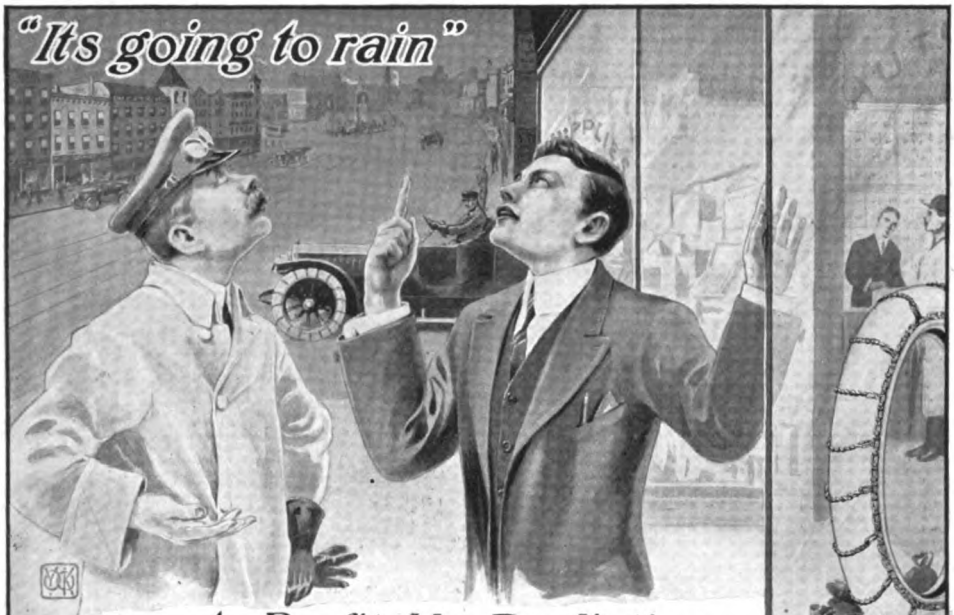

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You should always be ready for a rainy day, Mr. Dealer—a stock of Weed Chains on your shelves to supply the demand that always "reigns when it pours."

Write for particulars regarding a 30 x 3 1-2 tire that we will express to you free of charge if you agree to equip it with WEED CHAINS for display in your window.

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CLEANERS (Continued)

GLASS WIND SHIELD CLEANERS (Continued)

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y. "Security."

KERN Mfg. Co., 68-70 E. Tupper St., Buffalo, N. Y.

OUTLOOK Wind Shield Cleaner Co., 2581 E. 49th St., Cleveland, O.

SECURITY—See Grossman Mfg. Co.

CLEATS

FIBRE WIRING CLEATS

(See also Fibre, Hard)

AMERICAN Vulcanized Fibre Co., Wilmington, Del. (See page 179.)

BLAKE Signal & Mfg. Co., 251 Causeway St., **Boston, Mass.**

CONCRETE Fibre Co., Ford & Lafayette Sts., Norristown, Pa.

DIAMOND State Fibre Co., Elsmere, Del.

EASTERN Hard Fibre Co., 50 Church St., New York, N. Y. (See page 179.)

SPAULDING & Sons Co., J., Wheeler St., Tonawanda, N. Y.

STANDARD Fibre Co., Miller St., Somerville. Mass.

WILMINGTON Fibre Specialty Co., Wilmington, Del. (See page 179.)

CLIPS

CURTAIN CLIPS

(For attaching curtains to wind shields and bow sockets)

STANDARD Top & Equipment Co., 1212 Huron Rd., Cleveland, O. "Swan."

SWAN—See Standard Top & Equipment Co.

SPRING CLIPS

(See also Forgings, Drop)

ATWATER Mfg. Co., Southington, Conn.

CLAPP Mfg. Co., E. D., Auburn, N. Y.

CLEVELAND Hardware Co., Cleveland, O.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

ECCLES Co., Richard, Auburn, N. Y. (See page 131.)

PAGE-STORMS Drop Forge Co., Chicopee. **Mass.**

SEWARD & Son Co., M., Grant Sq., New Haven, Conn.

STRIEBY & Foote Co., 301 Ogden St., Newrak, N. J.

UNION Forging Co., Union, N. Y. (See page 131.)

WILCOX Mfg. Co., D., Mechanicsburg, Pa.

TRIMMERS CLIPS

BUSER-POSTON Tufting Machine Co., Chillcothe, O.

MEYER & Co., John C., Lowell, **Mass.**

CLOCKS

DASHBOARD CLOCKS

(See also Holders, Watch)

ARCADIA—See Waterbury Clock Co.

BELMONT—See New Haven Clock Co.

BOSTON Clock Co., 16 State St., Boston Mass.

BRIARCLIFF—See Levy & Co.

CHELSEA Clock Co., 16 State St., Boston Mass.

COX Brass Mfg. Co., Albany, N. Y. (See page 467.)

DEVERE—See New Haven Clock Co.

DIDISHEIM & Bro., Hipp, 54 Maiden Lane New York, N. Y. "Octava."

DIEPPE—See New Haven Clock Co.

DUANE—See New Haven Clock Co.

ETERNA—See Meyer, Ernest C.

FLORIDA—See Waterbury Clock Co.

JERICHO—See New Haven Clock Co.

LEVY & Co., Manasseh, 182 Broadway, New York, N. Y. "Briarcliff," "Safety."

MEYER, Ernest C., 822 Citizens Bldg. Cleveland, O. (Importer.) "Eterna." (See page 539.)

MINEOLA—See New Haven Clock Co.

NEW Haven Clock Co., New Haven, Conn. "Jericho," "Westbury," "Mineola," "New Ormond," "Savannah," "Dieppe," "Belmont," "Duane," "Devere."

NEW ORMOND—See New Haven Clock Co.

OCALA—See Waterbury Clock Co.

OCTAVA—See Didisheim & Bro.

ORLANDO—See Waterbury Clock Co.

PALATKA—See Waterbury Clock Co.

PECK-HAMRE Mfg. Co., Berlin, Wis.

PENSACOLA—See Waterbury Clock Co.

PHINNEY-WALKER Keyless Clock Co., 77 E. 130th St., New York, N. Y.

RONSON Specialty Co., 7-15 Mulberry St. Newark, N. J.

SAFETY—See Levy & Co.

SAVANNAH—See New Haven Clock Co.

SUWANEE—See Waterbury Clock Co.

TAMPA—See Waterbury Clock Co.

TARPON—See Waterbury Clock Co.

WALTHAM Watch Co., Waltham, Mass. (See pages 130a and 130b.)

WATERBURY Clock Co., Waterbury, Conn. "Florida," "Pensacola," "Tampa," "Ocala," "Suwanee," "Tarpon," "Arcadia," "Orlando," "Palatka."

WESTBURY—See New Haven Clock Co.

Complete Index to Classification appears on Pages 8 to 22.

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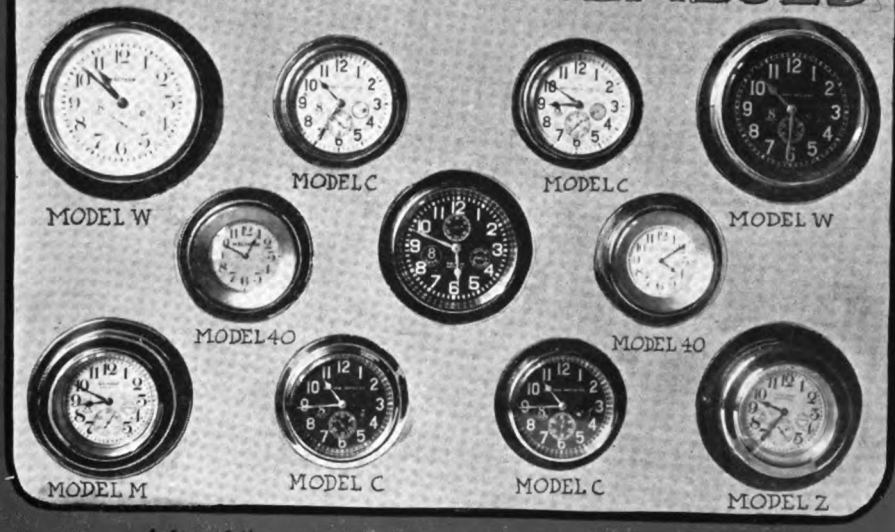
WALTHAM
FLUSH TYPE
AUTOMOBILE TIMEPIECES



A few of the numerous sizes and styles of flush type WALTHAMS for automobile use.

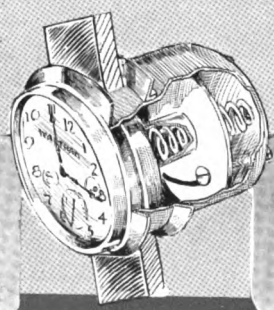
The trend of the times is toward an instrument board free from complication. Nearly all manufacturers of automobiles attempt now to place the instruments flush with the instrument board.

The new **WALTHAM FLUSH TYPE TIMEPIECES** are made to fill just that need. They are the most perfectly constructed timepieces for automobile use, being guaranteed to withstand automobile vibration and to give the same service as the chronometer gives on board ship. They are so constructed that they fit flush with the dash, are absolutely proof against theft, and can be wound with the greatest convenience.

These clocks are so constructed that when you give the bezel a quarter turn the movement is forced out, bringing the winding key into the most convenient position.

Here is indeed the ultimate timepiece for motor cars.

Showing dial flush with dash.



Internal construction of flush type case.

Bezel sprung out showing convenience of folding wind and setting key.

WALTHAM WATCH COMPANY

Waltham Mass.

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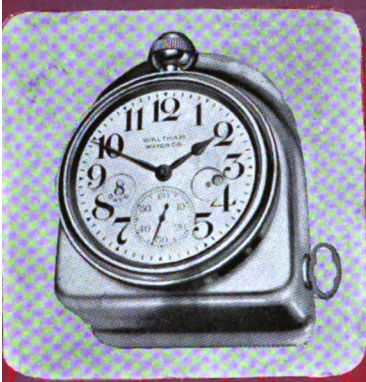

MODEL "B"—Adapted for limousines, coupes, landaus and other closed cars. Also very suitable for dashes of touring cars. Theft and waterproof.

MODEL "B"—Shown ready to wind. A quarter turn of the bezel brings the winding crown into the most convenient position for winding.

WALTHAM AUTOMOBILE TIMEPIECES ARE THE FIRST TIMEPIECES EVER DESIGNED ESPECIALLY FOR AUTOMOBILES

It seems incredible that car owners, and even car manufacturers have expected clocks made for mantelpieces to give good service on automobiles. Heretofore automobile timepieces have been mere **adaptations. WALTHAM TIMEPIECES are constructed specifically** to withstand automobile vibration.

THE WALTHAM FACTORIES' facilities for the manufacture of scientific timepieces have been used for producing an instrument that positively will withstand the strenuous conditions of motor car travel.

Automobile manufacturers are today keenly awake to the necessity of furnishing car equipment equally as good as their cars. They have learned that no matter how good a car may be it is judged largely by its accessories. That accounts for the large number of car manufacturers now equipping their best product with WALTHAM TIMEPIECES.

The interests of manufacturer and dealer and owner are mutual in having a timepiece as good as their cars.

Investigate the points of superiority in the **WALTHAM** automobile timepieces.

Manufactured and Guaranteed by

WALTHAM WATCH COMPANY

Waltham **Mass.**

Showing Model "E" applied to toilet case. It has all the elegance desired.

This model is adapted for installation above the front window of limousines, coupes and other closed cars.

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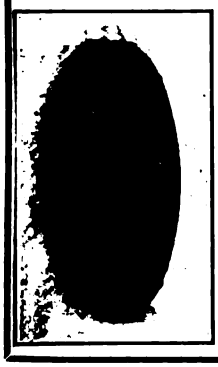


ANTI-SKID DEVICE FOR MOTOR TRUCKS

WHICH DOES NOT INJURE TIRES

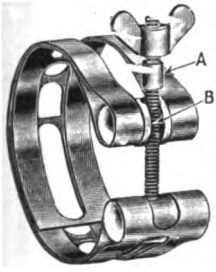
The simplest and most efficient device.

Easy to attach and detach.

No side chains or cross chains, but a practical anti-skid and traction device designed expressly for motor trucks using dual tires.

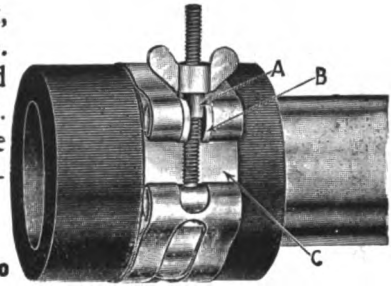
Write For Quotations To

NEVER-SKID MFG. CO., 794-8 Tenth Ave., New York



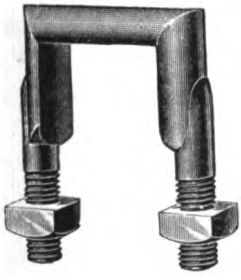
The Catelain Hose Coupling or Clamp

Strongest, simplest, most reliable made. Attached or detached in a few seconds. Made of brass. Note construction in illustrations.



WRITE FOR FOLDER

A. CATELAIN, 1446-48 Indiana Ave., Chicago



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AUBURN, N. Y.

VEHICLE FORGINGS

FROM STOCK, OR MADE SPECIAL
FROM BLUE PRINT OR MODEL

AUTO SPRING CLIPS

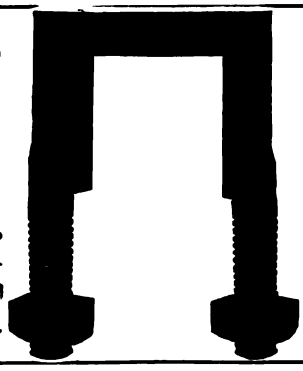
No. 145

Made and Carried in Stock in LARGE VARIETY OF SIZES. Get Our Blue Prints. Made to Special Order in Special Sizes— From Blue Prints, Models or Samples.

HIGHEST GRADE STOCK AND WORKMANSHIP

TRADE U MARK ═══QUALITY BRANDED═══ TRADE U MARK

The Union Forging Co. Union, N. Y.



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CLOTH

ENAMELED CLOTH

ACME Rubber Mfg. Co., Trenton, N. J.

AMERICAN Rubberfelt Co., 2215 Elston Ave., Chicago, Ill. "Arco."

ARCO—See American Rubberfelt Co.

BAYONNE—See Boyle & Co.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y. "Bayonne."

BULL DOG—See Mutty Co.

CHANDLER Oil Cloth & Buckram Co., East Taunton, Mass.

COOK'S Linoleum Co., Trenton, N. J.

DRIKAR—See Pantasote Co.

LANDERS Bros. Co., Toledo, O. (See page 107.)

MERITAS—See Standard Oil Cloth Co.

MONARCH Rubber & Oil Cloth Co., 41 N. Seventh St., Philadelphia, Pa.

MUTTY Co., L. J., Boston, Mass. "Bull Dog." (See page 133.)

PANTASOTE Co., 11 Broadway, New York, N. Y. "Drikar."

POTTER Sons & Co., Thomas, Lafayette Bldg., Philadelphia, Pa.

STANDARD Oil Cloth Co., 320 Broadway, New York, N. Y. "Meritas."

MOHAIR CLOTH

BULL DOG—See Mutty Co.

CARR Co., F. S., Boston, Mass. (See page 299.)

CHASE & Co., L. C., Boston, Mass. (See page 439.)

CLEANEASY—See Haartz, W. A. & J. C.

du PONT Fabrikoid Co., Wilmington, Del.

HAARTZ, W. A. & J. C., Boston, Mass. "Cleaneasy." (See page 251.)

LANDERS Bros. Co., Toledo, O. (See page 107.)

MUTTY Co., L. J., Boston, Mass. "Bull Dog." (See page 133.)

SCHERER & Co., H., Detroit, Mich.

RUBBER CLOTH

ACME Rubber Mfg. Co., Trenton, N. J.

BULL DOG—See Mutty Co.

CARR Co., F. S., Boston, Mass. (See page 299.)

CHASE & Co., L. C., Boston, Mass. (See Page 439.)

COOK'S Linoleum Co., Trenton, N. J.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

FAIRFIELD Rubber Co., Fairfield, Conn.

HAARTZ, W. A. & J. C., Boston, Mass. (See page 251.)

LANDERS Bros. Co., Toledo, O. (See page 107.)

MATTSON Rubber Co., Lodi, N. J. (See page 419.)

MONARCH Rubber & Oil Cloth Co., 41 N. Seventh St., Philadelphia, Pa.

MUTTY Co., L. J., Boston, Mass. "Bull Dog." "Numotor." (See page 133.)

NUMOTOR—See Mutty Co.

WHITE & Reid, Jefferson & 11th Sts., Hoboken, N. J.

UPHOLSTERY CLOTH

(See Broadcloth; also Silk; also Whipcord)

WIRE CLOTH

(For use in Strainers, Horn Screens, etc.)

BUFFALO Wire Works Co., 431 Terrace, Buffalo, N. Y.

CLINTON Wire Cloth Co., Clinton, Mass.

DE WITT Wire Cloth Co., 299 Broadway, New York, N. Y.

MICHIGAN Wire Cloth Co., 511 Howard St., Detroit, Mich.

NEW Jersey Wire Cloth Co., Trenton, N. J.

TYLER Co., W. S., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

CLOTHING

MOTORISTS CLOTHING

(See also Caps; also Gloves; also Leggings; also Mufflers)

ADIRONDACK—See Spear-Martin Fur Co.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

ARMSTRONG, E. A., 208 W. Kinzie St., Chicago, Ill.

AURORA Uniform Co., 44 Downer Pl., Aurora, Ill.

AUTO-SHIRT Co., Midland, Md.

AUTOMOBILE Apparel Co., 14 W. 22d St., New York, N. Y.

BALLARD & Co., J. O., Malone, N. Y.

BEATS ALL—See Standard Oiled Clothing Co.

BISHOP Co., J. H., Wyandotte, Mich.

BLAUVELT Knitting Co., 280-84 Plane St., Newark, N. J.

BOYNTON'S Improved Process Oil Clothing Co., Vincent St., Gloucester, Mass.

BRADLEY Knitting Co., Delavan, Wis.

BURLINGTON Blanket Co., Burlington, Wis. "Chy-Nuke."

CHICAGO Auto Robe Supply Co., 12-16 S. Market St., Chicago, Ill. "Perfection."

CHY-NUKE—See Burlington Blanket Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

DEMMERLE & Co., 248 W. 23d St., New York, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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MANUFACTURERS

Who consider quality as well as price will do well to examine our new line of **NUMOTOR** fabrics for tops and seat covers.

NUMOTOR fabrics are made from high grade combed cotton dyed in the fibre, which is the only way that will insure an absolutely fast and even color. They are **FIBRE-DYED** with **INDANTHRENE DYE.**

THIS DYE IS THE UNITED STATES AND GERMAN GOVERNMENTS' STANDARD AND IS THE FASTEST DYE KNOWN.

We can show you samples that have been tested nine months and the change is so slight it is hardly perceptible.

We make these materials **DOUBLE TEXTURE** with a **HIGH GRADE PARA RUBBER** interlining for tops in our famous **BULL DOG QUALITY.** For curtains we furnish the material either **SINGLE TEXTURE** or **DOUBLE TEXTURE.** For seat covers we make a **SINGLE TEXTURE** material to match the top perfectly and this can be removed and cleansed at any time. For upholstery in place of leather, we apply a rubber surface coating on the under side of the material, which renders it waterproof. It is more durable and easier to ride on than leather.

All **NUMOTOR** fabrics are thoroughly shrunk before shipment which aids greatly in keeping the top and seat covers in shape.

This line is new and interesting and can be obtained from no other source. Write us for samples.

See our exhibit at Space D-208 at the 14th National Automobile Show, January 3rd to 10th in the Grand Central Palace.

L. J. MUTTY CO., Boston, Mass.

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CLOTHING (Continued)

MOTORISTS CLOTHING (Continued)

DETROIT Overall Co., Detroit, Mich.

ELCO—See Loewenberg Co.

ELLSWORTH & Thayer Mfg. Co., 336-40 Broadway, Milwaukee, Wis. "Great Western."

EVERDRI—See Loewenberg Co.

FOX, Stiefel & Co., 349 Fifth Ave., New York, N. Y.

FRANKLIN Rubber Co., 105 Summer St., Boston, Mass.

FREEMAN-HIRSCHTICK Co., 227 W. Madison St., Chicago, Ill.

GOODYEAR Rubber Co., 787 Broadway, New York, N. Y.

GREAT WESTERN—See Ellsworth & Thayer Mfg. Co.

HALL & Co., R. S., Versailles, O.

HERCULES Waterproofing Co., 62 Centre St., New York, N. Y.

HILL Mfg. Co., Richard F., 217-19 High St., Newark, N. J.

HODGMAN Rubber Co., 806 Broadway, New York, N. Y.

HUMPHREYS Sons, R. A., 1021-23 Callowhill St., Philadelphia, Pa.

JAEGERS S. W. S. Co., 895 Fourth Ave., New York, N. Y.

KENYON Co., C., Broadway & 23d St., New York, N. Y.

KLING Bros. & Co., 291 Fifth Ave., Chicago, Ill.

LARGMAN Skirt Mfg. Co., 1023-25 Vine St., Philadelphia, Pa.

LEVY & Co., M., 331 W. Broadway, New York, N. Y.

LOEWENBERG Co., 58-62 Golden St., Newark, N. J. "Everdri," "Elco."

McKIBBEN, Driscoll & Dorsey, St. Paul, Minn.

MANN Co., Leon, 715-19 Broadway, New York, N. Y.

MILFORD Shoe Co., 177 Central St., Milford, Mass.

MOORE-SMITH Co., Winthrop Sq., Boston, Mass.

MORAWETZ Co., 317-25 E. Water St., Milwaukee, Wis.

NEW YORK Leather Coat Co., 33-35 Greene St., New York, N. Y.

PARKER Co., John H., 25 James St., Malden, Mass.

PERFECTION—See Chicago Auto Robe Supply Co.

PONTIAC Knitting Co., Pontiac, Mich.

REVILLON Freres, 19 W. 34th St., New York, N. Y.

ROSENTHAL & Katz, 15 W. 26th St., New York, N. Y.

ROSENWALD & Weil, 500 Franklin St., Chicago, Ill.

RUSZITS Fur Co., John, 7 E. 48th St., New York, N. Y.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

STANDARD Oiled Clothing Co., 152d St. & Tinton Ave., New York, N. Y. "Beats All."

STAR Storm Front Co., Canal St., Troy, O.

TOPLITZ, George, 11 E. 22d St., New York, N. Y.

TOWER Co., A. J., 22 Simmons St., Boston, Mass.

UPTHEGROVE Sporting Goods Co., Valparaiso, Ind.

WALLACE Co., Hugh, 2626 E. Grand Boulevard, Detroit, Mich. (See page 351.)

CLUTCHES

AUTOMOBILE FRICTION CLUTCHES

AMERICAN Die & Tool Co., Second & Buttonwood Sts., Reading, Pa.

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind. (See page 135.)

BIGGAM Engineering Co., Lansing St. & Military Rd., Buffalo, N. Y.

BORG & Beck, Moline, Ill.

CLEVELAND Clutch Co., Ravenna, O.

COTTA Gear Co., Ninth St. & 19th Ave., Rockford, Ill.

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

HARTFORD Auto Parts Co., Hartford, Conn. (See page 137.)

HELE-SHAW—See Merchant & Evans Co.

HILLIARD Clutch & Machinery Co., 104 W. Fourth St., Elmira, N. Y.

KIRKHAM Motor Mfg. Co., Williams St., E., Bath, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa. (See page 383.)

McINTYRE Mfg. Co., 172-82 W. Locust St., Columbus, O.

MERCHANT & Evans Co., Philadelphia, Pa. "Hele-Shaw." (See page 135.)

MODEL Gas Engine Works, Peru, Ind. "Wells." (See page 377.)

MOTORFLEX Equipment Co., 200 Fifth Ave., New York, N. Y.

PALMITER Clutch Co., South Bend, Ind.

PNEUMATIC Clutch-Motor Co., 812 E. Third St., Los Angeles, Cal.

POSITIVE Clutch Co., 1345 Rawson St., Chicago, Ill.

REED Foundry & Machine Co., Kalamazoo, Mich.

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind. (See page 253.)

WARNER Mfg. Co., Toledo, O. (See page 481.)

WAUKESHA Motor Co., Waukesha, Wis. (See page 277.)

WELLS—See Model Gas Engine Works.

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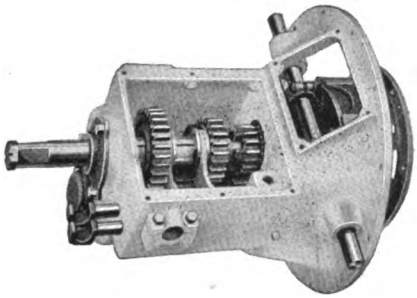
B - T - K



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Complete Unit Power

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The **EVANS** Model

HELE-SHAW CLUTCH

Multiple disc running in oil. The only clutch that is or can be made with wedge shape annular grooves. Is the **most flexible** and **powerful clutch** in the world. Over 100,000 in use. *Write for catalog* 42.

"M & E"

GREASE CUPS

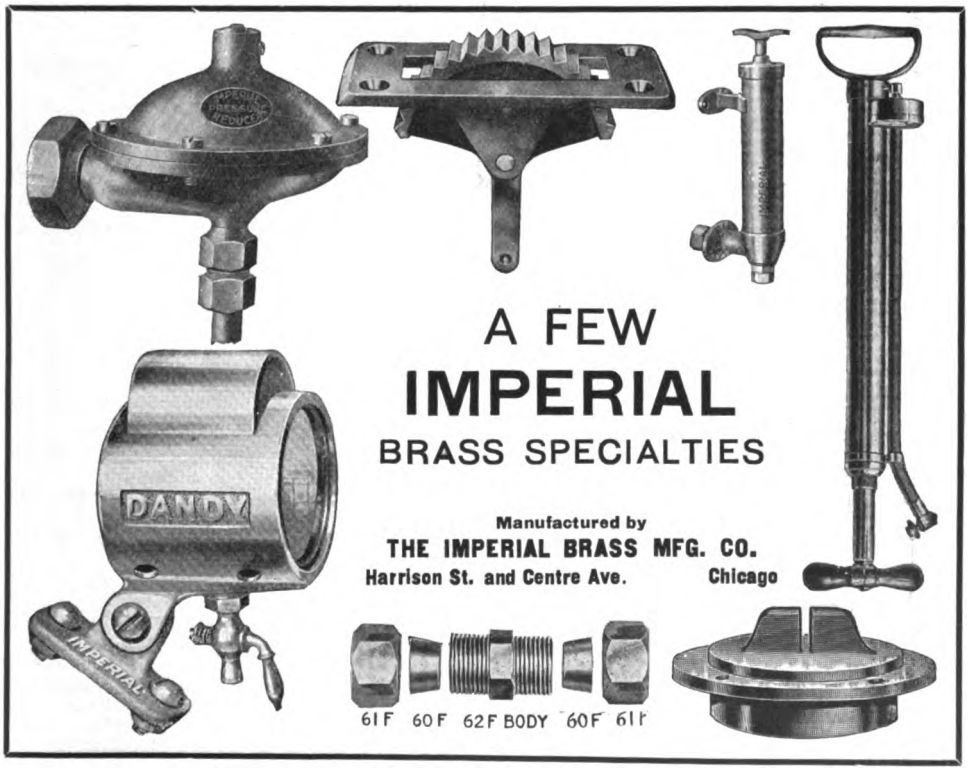
Lubricate perfectly. Ratchet top cannot rattle loose. Used by the best car manufacturers. All sizes—brass or steel. *Send for catalog* 38 *and samples.*

Also manufacturers of STAR Tire and Tool cases (pressed steel), S. A. E. Phosphor Bronze Bearing Metal, EVANS Alignment Joints, Babbitt Metal, etc., etc.

Merchant & Evans Co.

PHILADELPHIA

New York, Brooklyn, Baltimore, Wheeling, Cleveland, Chicago, Kansas City.



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COATS

AUTOMOBILE COATS

(See Clothing, Motorists)

COCKS

SPRING KEY COCKS

AMERICAN Brass & Iron Co., Crystal St. & Trombley Ave., Detroit, Mich.

CRUM-WILEY Mfg. Co., Peru, Ind.

DETROIT Brass Works, 2000 Brooklyn Ave., Detroit, Mich.

EDELMANN & Co., 225 W. Illinois St., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

STANDARD Brass Works, 528-30 Woodbridge St., E., Detroit, Mich.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

STANDARD PET COCKS

ACORN Brass Mfg. Co., 51 N. Peoria St., Chicago, Ill.

AMERICAN Brass & Iron Co., Crystal St. & Trombley Ave., Detroit, Mich.

AMERICAN Lubricator Co., Summit Ave. & Wabash Ry., Detroit, Mich.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BELKNAP Mfg. Co., Bridgeport, Conn.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 519 S. Canal St., Chicago, Ill.

CRUM-WILEY Mfg. Co., Peru, Ind.

DETROIT Brass Works, 2000 Brooklyn Ave., Detroit, Mich.

DETROIT Lubricator Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

EAGLE Brass Works, Dubois & Franklin Sts., Detroit, Mich.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

HAYDENVILLE Co., Haydenville, Mass.

HOMER Brass Works, 231 Race St., Philadelphia, Pa.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

JARECKI Mfg. Co., Erie, Pa.

KELLY & Jones Co., Greensburg, Pa.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

McRAE & Roberts Co., 221-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-78 Beaubien St., Detroit, Mich.

MORGAN, B., John St., Newport, R. I.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NOLTE Brass Co., Springfield, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

REGESTER'S Sons Co., J., Holliday & Saratoga Sts., Baltimore, Md.

ROBERTS Brass Mfg. Co., 1395-1407 Fort St., W., Detroit, Mich.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

SOUTH Park Mfg. Co., Port Huron, Mich.

STANDARD Brass Works, 528-30 Woodbridge St., E., Detroit, Mich.

SWIFT Lubricator Co., Elmira, N. Y.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

COILS

PIPE COILS

NATIONAL Pipe Bending Co., River & Lloyd Sts., New Haven, Conn.

SPARK COILS

ACKLEY Electric Co., Cortland, O.

AMERICAN Coil Co., Foxboro, Mass.

AMERICAN Motor Parts Co., 52d St. & Baltimore Ave., Philadelphia, Pa. "Ampco."

AMPCO—See American Motor Parts Co.

ATWATER Kent Mfg. Works, 4937 Stenton Ave., Philadelphia, Pa.

AUTOCOIL Co., 132 Seventh St., Jersey City, N. J.

BLACKBURN - ALLEN CO., Dayton, O. "Noxon."

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See page 497.)

DAYTON-DICK Co., Quincy, Ill. (See page 409.)

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DELCO—See Dayton Engineering Laboratories Co.

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex."

HEINZE Electric Co., Lowell, Mass. (See page 581.)

HERZ & Co., New York, N. Y. (Importers.) (See page 599.)

HOLTZER-CABOT Electric Co., Brookline, Mass. (See page 231.)

J. & B. Mfg. Co., 65 Eagle St., Pittsfield, Mass.

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UNIVERSAL JOINTS & CONE CLUTCHES

HARTFORD UNIVERSAL JOINTS

We are able to offer manufacturers universal joints manufactured by specialists in one of the largest plants in the world.

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HARTFORD CONE CLUTCHES

Hartford Cone Clutches require no introduction to the American car manufacturers.

Automobile makers who don't want the trouble and inefficient service resulting from warped discs should investigate Hartford Cone Clutches. They are as efficient as the best disc type at half the price. Let us know your requirements.

J. S. BRETZ CO., New York, Detroit

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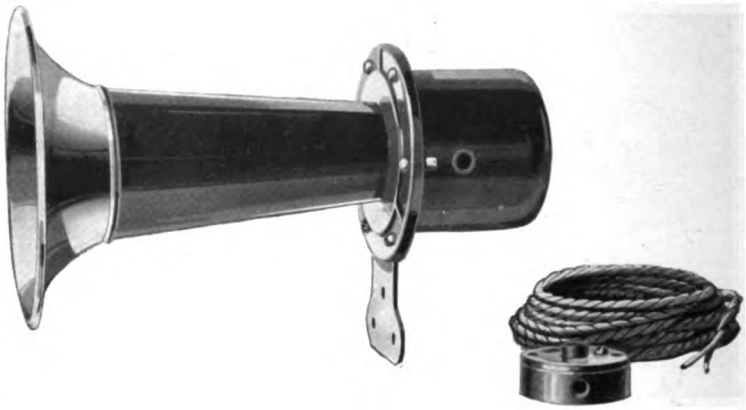

REXO II

$3.85

The Rexo II is the best and sturdiest warning signal that can be bought for less than Ten Dollars.

Its wonderful retail price is based on a production of 100,000 during the 1914 season. Sixty thousand have been contracted for as standard equipment by thirty motor car manufacturers.

REXO II'S are in the hands of dealers ready for delivery. Look up one for your car.

Rexo II Warning Signals are electrically operated.

Are of ELYRIA-DEAN Quality.

Same high grade material and workmanship used as entered into the original Eight Dollar Rexo—more than 80,000 of them sold during 1913 season.

Operates on six volts.

One adjustment yearly the total care required.

Horn furnished in Black and Nickel or Black and Brass.

Finished with two coats of baked enamel (not air dried which chips) developed by years of study in the telephone business.

Six-inch bell, quadruple plated.

Furnished in triple corrugated paper box, complete with cord, button and instruction book, ready for mailing or expressing.

Also Special FORD-REXO II — $3.85

See Your Dealer

THE DEAN ELECTRIC CO.

2515 Taylor Street, ELYRIA, OHIO

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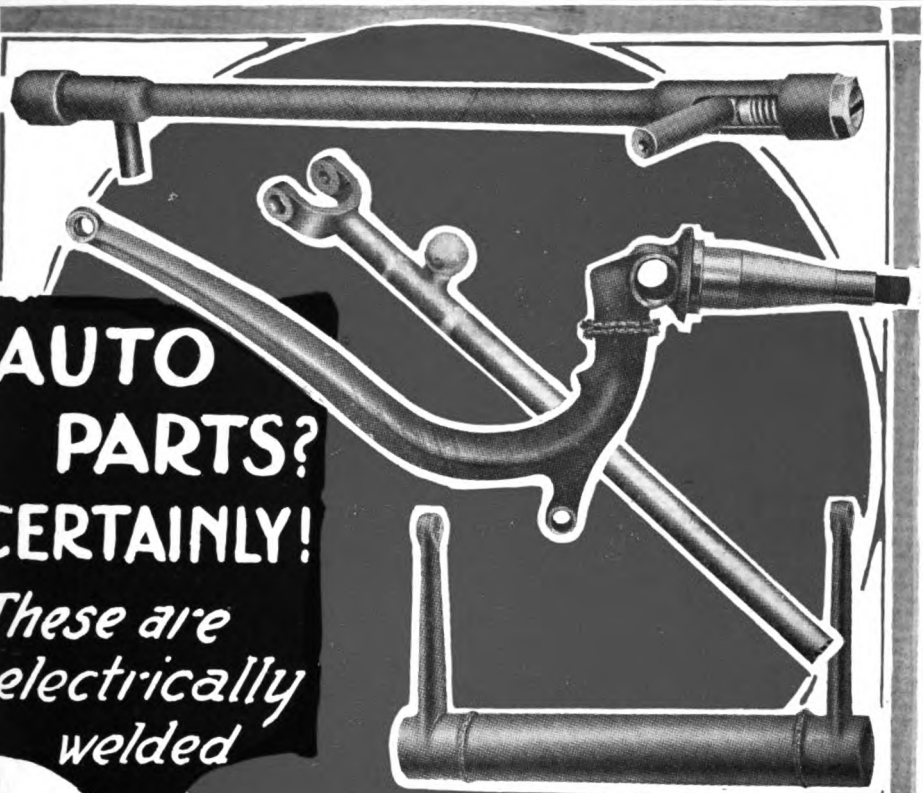

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These are electrically welded

Automobile Parts that Can Be Made to Advantage by Electric Welding.

- Accelerator Links
- Brake and Control Rods
- Brake Expander Cam Shafts
- Drag Links
- Forgings to solid Stock or Tubing
- Front Axle Tie Rods
- Gear Blanks
- Lamp Brackets
- Radiator Tie Rods
- Rear Axle Flange Shafts
- Radius Rods
- Starting Crank
- Torsion Rods
- Tubes to Machined Ends And Other Like Parts

Electric Welding

Electric Welding is a necessity in the production of many desirable features of construction. It is certainly the most satisfactory method of producing many automobile parts and usually the most economical.

We have the knowledge, the experience and the facilities necessary to produce high grade work.

WRITE US.

Michigan Electric Welding Co.
514 Hart Ave., Detroit, Michigan

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You can't afford to ignore one single item which will drive home not only the supremacy of your car but its synonymity with comfort.

Other manufacturers may have all that you have in the way of interesting and extraordinary talking points; but you will have an additional one if you can say to prospective purchasers that your cars have convertible bodies.

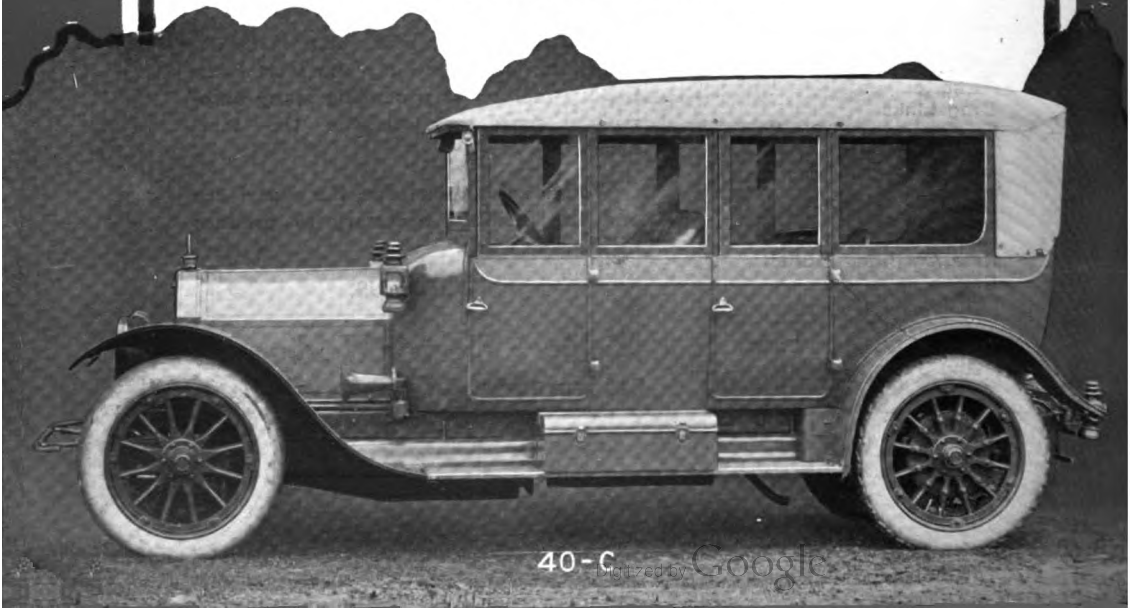
With a SPRINGFIELD CONVERTIBLE BODY they are assured absolute protection from heat, cold, rain, snow or dust. In one unit, it combines the protection and shelter of a closed car with the freedom of an open touring car. The change from one to the other takes but a few moments.

We have facilities ample for the production of any amount of bodies necessary to meet the demands of the manufacturer who is far-sighted enough to see the decided advantages of selling one car with a body possessing every merit of both limousine and touring car.

Our handsome booklet should be in your office. Write for it.

SPRINGFIELD METAL BODY CO.

Springfield, Mass.



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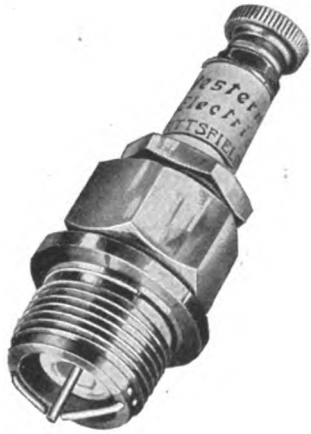
Combination
Porcelain-Mica
7/8" Spark Plug



Look at the unusually heavy porcelain petticoat in this spark plug

Combination
Porcelain-Mica
1/2" Spark Plug

Western Electric

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are reliable and are made for every requirement.

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Richmond	Cincinnati	Denver	Houston	Vancouver	Johannesburg
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COILS (Continued)

SPARK COILS (Continued)

K-W Ignition Co., 2833 Chester Ave., Cleveland, O.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

LINDSLEY & Allen Electric Co., 257-59 Eddy St., Providence, R. I. "Solocoil."

LISLE Mfg. Co., Clarinda, Ia.

MANHATTAN Electrical Supply Co., New York, N. Y. "Mesco."
(See page 533.)

MENOMINEE Electric Mfg. Co., Menominee, Mich.

MESCO—See Manhattan Electrical Supply Co.

NATIONAL Coil Co., Lansing, Mich.

NEW York Coil Co., 238-40 Pearl St., New York, N. Y.

NOXON—See Blackburn-Allen Co.

ORSWELL Igniter Co., 37 Haverhill St., Boston, Mass. "Puritan."

PERFEX—See Electric Goods Mfg. Co.

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 141.)

PURITAN—See Orswell Igniter Co.

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SOLOCOIL—See Lindsley & Allen Electric Co.

SPLITDORF Electrical Co., 93 Warren St., Newark, N. J.

WELLS Mfg. Co., R. C., Station A., Fond du Lac, Wis.
(See page 409.)

WESTERN Electric Co., 463 West St., New York, N. Y.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

COLORS

COACH COLORS

(See Paints and Colors)

COLUMNS

WATER COLUMNS AND BOILER ALARMS

RELIANCE Gauge Column Co., 45 E. Prospect St., Cleveland, O.

COMMUTATORS

ELECTRIC MOTOR COMMUTATORS

CAMERON Electrical Mfg. Co., Ansonia, Conn.

COLUMBIA Machine Works & Malleable Iron Co., Chestnut St. & Atlantic Ave., Brooklyn, N. Y.

EUREKA Co., North East, Pa.
(See page 273.)

HOMER Commutator Co., 4748 Hough Ave., N. E., Cleveland, O.

VAN DORN & Dutton Co., Cleveland, O.
(See page 471.)

SPARK COMMUTATORS

(See Timers, Ignition)

COMPOSITION

INSULATING COMPOSITION

(Substitute for Hard Rubber)

BAKELITE-DILECTO—See Continental Fibre Co.

CONDENSITE—See Duranoid Mfg. Co.

CONDENSITE Co. of America, Belleville Ave., Glen Ridge, N. J.

CONTINENTAL Fibre Co., Newark, Del.
(See page 143.)

DICKINSON Mfg. Co., ft. Mechanic St., Springfield, Mass. "Sternoid," "Stern-Condensite," "Stern-Asbestos."

DURANOID Mfg. Co., 213-19 Chestnut St., Newark, N. J. "Condensite."

ELECTROSE Mfg. Co., 70 Washington St., Brooklyn, N. Y.

GENERAL Insulate Co., 1008-14 Atlantic Ave., Brooklyn, N. Y. "Hi-Heet."

HI-HEET—See General Insulate Co.

SPECIALTY Mfg. Co., Pittsfield, Mass.

STERN-ASBESTOS—See Dickinson Mfg. Co

STERN-CONDENSITE—See Dickinson Mfg. Co.

STERNOID—See Dickinson Mfg. Co.

COMPOUNDS

ANTI-FREEZING COMPOUNDS

BLIZZARD—See Globe Soap Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

CINCINNATI Oil Works Co., Cincinnati, O. "Wizard."
(See page 143.)

FREZENOT—See Rub-On Mfg. Co.

GLOBE Soap Co., Cincinnati, O. "Blizzard."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

JEWEL—See Wadsworth-Howland Co.

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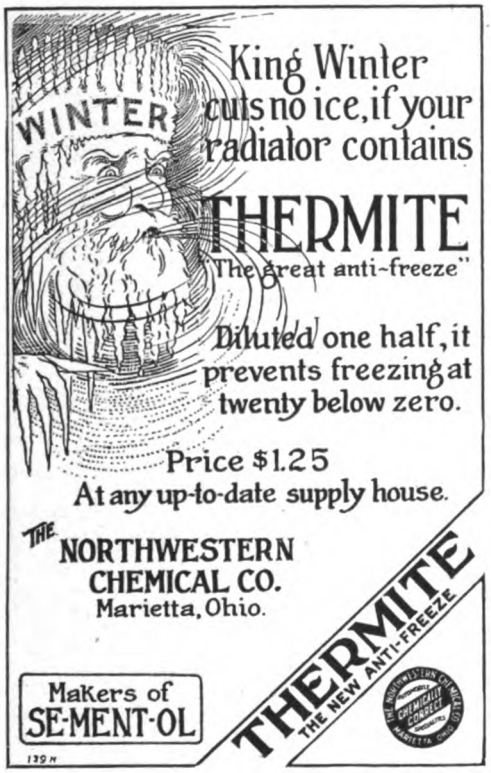

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A laminated INSULATING material of highest efficiency.

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WORKS FASTER LASTS LONGER WATERPROOF
DOES NOT SETTLE

RE-NU AUTO BODY GLOSS

CLEANS POLISHES PRESERVES CONTAINS NO SEDIMENT

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Transmission Oil	Engine Oil	Sanet Liquid Soap
Cup Grease	Lard Oil	Sunogen Disinfectant

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ESTABLISHED 1841 CINCINNATI, OHIO

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COMPOUNDS (Continued)

ANTI-FREEZING COMPOUNDS (Continued)

K M C—See Karboneater Mfg. Co.

KARBONEATER Mfg. Co., Vanadium Bldg., Pittsburg, Pa. "K M C."

LUBRO Oil Co., 116 Prospect Ave., N. W., Cleveland, O.

NORTHWESTERN Chemical Co., Marietta, O. "Thermite."
(See pages 143 and 551.)

PREMIUM—See Blue Ribbon Mfg. Co.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y. "Frezenot."

THERMITE—See Northwestern Chemical Co.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WIZARD—See Cincinnati Oil Works Co.

WONDER WORKER—See Hall-Thompson Co.

CARBON REMOVING COMPOUNDS

(See also Removers, Carbon; also Machines, Motor Decarbonizing)

AMERICAN Carboneter Co., 1402 Michigan Ave., Chicago, Ill.

ARROW—See Peterson Co.

ATLAS Auto Supply Co., 95 E. Adams St., Chicago, Ill. "Destroyo."
(See page 149.)

AUTOPOWER—See Lakewood Chemical Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

C-R Supply Co., 410 Elm St., Ottawa, Kans.

CAR-BON-GO—See Van Tilburg Oil Co.

CARBOLIDE Chemical Co., Monrovia, Md.

CARBONOX—See Northwestern Chemical Co.

CHAMBERLAIN Co., Sixth Ave. & Grant St., Pittsburgh, Pa. "Desolvo."

CRIMSO CO., Topeka, Kans.

DAYTON Inner-Tire & Mfg. Co., 17 N. Madison St., Dayton, O.

DESOLVO—See Chamberlain Co.

DESTROYO—See Atlas Auto Supply Co.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DIAMOND Specialty Co., Indianapolis, Ind.
(See page 317.)

ENGINETONE—See McCormick Mfg. Co.

FRENCH Compression Fluide Co., 25 S. Allen Ave., Pasadena, Cal.

HALL-THOMPSON Co., Hartford, Conn. "Magic," "Wonder Worker."

HARVEY Chemical Co., 216 N. Fifth St., Lafayette, Ind.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

INTER-TUBE Chemical Co., Schofield Bldg., Cleveland, O.

INTERSTATE Mfg. Co., Walliston, Mass. "M. H. B."

JAMES-GRAY-KUHN Co., Pittsburg, Pa. "Korine."

JEWEL—See Wadsworth-Howland Co.

K M C—See Karboneater Mfg. Co.

KARBONEATER Mfg. Co., Vanadium Bldg., Pittsburg, Pa. "K M C."

KORINE Carbon Remover Co., 114 Friend St., Amesbury, Mass.

KREMBS & Co., 173 N. Green St., Chicago, Ill. "Purgcarbon."

LAKEWOOD Chemical Co., Citizens Bldg., Cleveland, O. "Autopower."

LOMASNEY & Bubb, 72 Adams St., E., Detroit, Mich.

M. H. B.—See Interstate Mfg. Co.

McCORMICK Mfg. Co., First & Sears Sts., Dayton, O. "Enginetone."

MAGIC—See Hall-Thompson Co.

METALITE Carbon Remover Co., 18-22 S. Second Ave., Marshalltown, Ia.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium-Decarbonizer."
(See page 507.)

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

NORTHWESTERN Chemical Co., Marietta, O. "Carbonox."
(See pages 143 and 551.)

ORIENT Chemical Co., Gumbel Bldg., Kansas City, Mo.

OWL—See Western Chemical Mfg. Co.

PANAMA Oil & Grease Co., 159-61 W. 51st St., New York, N. Y. "Wheatley."

PEARSON Carbon Remover Co., 809 Woodward Ave., Detroit, Mich.

PEERLESS Mfg. Co., 102d & Kempton Sts., Cleveland, O.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PREMIUM—See Blue Ribbon Mfg. Co.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

PURGCARBON—See Krembs & Co.

RADIUM-DECARBONIZER—See Milwaukee Auto Specialty Co.

RELIABLE Cement Co. (E. Akron), Akron, O.

T. A. D.—See Toledo Auto Devices Co.

THERMAL Efficiency Co., Aldan, Pa. "Thermo."

THERMO—See Thermal Efficiency Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

VAN TILBURG Oil Co., 2424-28 University Ave. S. E., Minneapolis, Minn. "Car-Bon-Go."

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WESTERN Chemical Mfg. Co., 151 Sixth St., Milwaukee, Wis. "Owl."

WHEATLEY—See Panama Oil & Grease Co.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

WORKO Co., 300 Winslow St., Racine, Wis.

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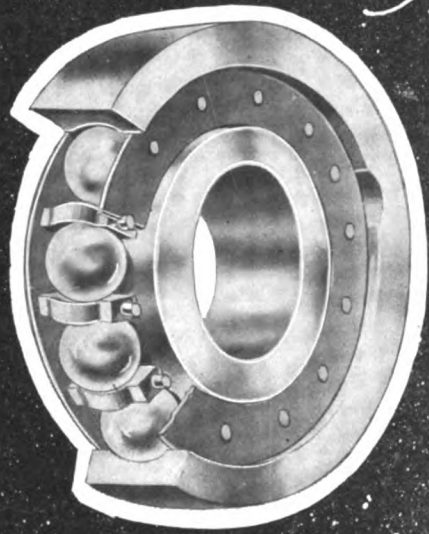

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COMPOUNDS (Continued)

CHEMICAL PLATING COMPOUNDS

(See also Polishes, Metal; also Enamels, Brass.)

ATLAS Auto Supply Co., 95 E. Adams St., Chicago, Ill. "Silver Quick." (See page 149.)

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

DOZIT—See Kirk Mfg. Co.

FOREST City Sales Co., Fremont, Neb. "Quick Knick."

GUN Metal Finish Co., Main & Water Sts., Decatur, Ill.

JUSTICE Co., A. R., 607 Chestnut St., Philadelphia, Pa. "U-Kan-Plate."

KIRK Mfg. Co., Gumbel Bldg., Kansas City, Mo. "Dozit."

NORTHWESTERN Chemical Co., Marietta, O. "Sil-Ver-Ol." (See pages 143 and 551.)

PAGE-LESTER Co., 125 W. Van Buren St., Chicago, Ill. "Silverkote."

PLATEON—See Western Automobile Supply Co.

PREMIUM—See Blue Ribbon Mfg. Co.

QUICK KNICK—See Forest City Sales Co.

SILVER QUICK—See Atlas Auto Supply Co.

SIL-VER-OL—See Northwestern Chemical Co.

SILVERNOTE—See Page-Lester Co.

U-KAN-PLATE—See Justice Co.

WESTERN Automobile Supply Co., 3900 Sheridan Rd., Chicago, Ill. "Plateon."

WOODWARD & Son, Nicholas Bldg., Toledo, O.

GLASS WIND SHIELD COMPOUNDS

(For keeping glass clear in rain or fog; For Mechanical Cleaners—See Cleaners, Glass Wind Shield)

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Premium."

FORBES Co., Benjamin P., 409 Superior Ave., N. W., Cleveland, O. "Glasbrite."

GLASBRITE—See Forbes Co.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

KLEAR-VIEU Co., Philadelphia, Pa.

PREMIUM—See Blue Ribbon Mfg. Co.

RELIABLE Cement Co. (E. Akron), Akron, O.

WONDER WORKER—See Hall-Thompson Co.

PUNCTURE SEALING COMPOUNDS

A. B. C.—See Pneumatic Tire Fluid Co.

BEN Hur Metal Polish Co., Crawfordsville, Ind.

INSTANTANEOUS Tire Healer Co., 722 Howard St., Detroit, Mich.

BUFFALO Specialty Co., 375 Ellicott St., Buffalo, N. Y. "Rubberstone."

DERRICKSON Mfg. Co., Muncie, Ind. "No-Air-Out."

GUARANTEE Puncture Cure Co., Des Moines, Ia.

INSTANTANEOUS Tire Healer Co., 722 Howard St., Detroit, Mich.

LIQUID Tire Tonic Co., 1426 McGee St., Kansas City, Mo.

NO-AIR-OUT—See Derrickson Mfg. Co.

PNEUMATIC Tire Fluid Co., 1732-50 Wazee St., Denver, Colo. "A. B. C."

PUNCTURE-PROOF Co., 207-11 E. Broadway, Louisville, Ky.

RUBBERSTONE—See Buffalo Specialty Co.

SEALO Tire Co., 1409 Michigan Ave., Chicago, Ill.

SIN-TI Rubber Co., Home Life Bldg., Washington, D. C.

TURNER-BIRDSEL Co., Springfield, O.

UNITED Puncturine Co., 676 Woodward Ave., Detroit, Mich. (See page 149.)

RADIATOR CLEANING COMPOUNDS

APEX—See U. S. Compound Co.

BANNER—See Cortland Specialty Co.

C-R Supply Co., 410 Elm St., Ottawa, Kans. "Radi-No-Leak."

COLZA Chemical Co., Mutual Life Bldg., Buffalo, N. Y.

CORTLAND Specialty Co., 176 Railroad St., Cortland, N. Y. "Banner."

DECALCIFIER—See Milwaukee Auto Specialty Co.

FIELD Auto Compound Mfg. Co., Auburn, Me.

FLUFF-FOE—See Garratt-Callahan Co.

GARRATT-CALLAHAN Co., 37 S. Clinton St., Chicago, Ill. "Fluff-Foe."

GILMER, Jr., G. Walker, 52 Seventh St., Philadelphia, Pa. "Skalout."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Decalcifier." (See page 507.)

NONKORODA Co., 225 Water St., New York, N. Y.

RADI-NO-LEAK—See C-R Supply Co.

SKALOUT—See Gilmer, Jr., G. Walker.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

U. S. Compound Co., 1425 Seneca St., Buffalo, N. Y. "Apex."

VELVET—See Sutherland & Co.

WONDER WORKER—See Hall-Thompson Co.

TIRE FILLING COMPOUNDS

AMERICAN Kushion-Kore Tire Co., 65 Main St. Buffalo, N. Y. "Kushion-Kore."

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COMPOUNDS (Continued)

TIRE FILLING COMPOUNDS (Continued)

CLARKS Resilient Tire Filler Co., Thomasville, Ga.

CUMBERLAND—See New York Tire Filler Co.

DAHL Punctureless Tire Co., Palace Bldg., Minneapolis, Minn.

ESSENKAY Products Co., 1125-29 W. 37th St., Chicago, Ill.

KUSHION-KORE—See American Kushion-Kore Tire Co.

MILLER'S Inner Tire Core Co., 14th & Clifton Sts., Washington, D. C.

MINDEASE Co., Keller Bldg., Louisville, Ky.

NATIONAL Tire Filler Co., 1415 Scribner Ave., N. W., Grand Rapids, Mich.

NEW York Tire Filler Co., 204-06 W. 75th St., New York, N. Y. "Cumberland."

NEWMASTIC Co., 151 W. 68th St., New York, N. Y.

NO-AIR Tire Compound Co., Scaritt Bldg., Kansas City, Mo.

PERFECTION Filler Co., Middlesex Ave., Somerville, Mass.

RUBERNIX Mfg. Co., 329 Broadway, Toledo, O.

ZILIO Mfg. Co., Unity Bldg., Chicago, Ill.

ZIP Co., Niagara Falls, N. Y.
(See page 551.)

TIRE PRESERVING COMPOUNDS

LASTO Chemical Co., 229-31 W. 42d St., New York, N. Y.

MYHTIB Rubber Tire Preserver Co., 373 Asylum St., Hartford, Conn.

NORTHWESTERN Chemical Co., Marietta, O. "Tire-Lac."

TIRE-LAC—See Northwestern Chemical Co.

TIRE REPAIR COMPOUNDS

(For filling cuts in outer casings)

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O. "Stickfast."

ATLAS Auto Supply Co., 95 E. Adams St., Chicago, Ill. "Tire-Doh."
(See page 149.)

BESTYET—See St. Louis Rubber Cement Co.

C. O. T. GUM GUM—See Tingley & Co.

COX, David H., Chestnut St., Roselle, N. J.

DAYTON Inner-Tire & Mfg. Co., 17 N. Madison St., Dayton, O.

EMPIRE Rubber & Tire Co., Mulberry St., & Clinton Ave., Trenton, N. J.

GOODRICH Co., B. F., Akron, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Selbst-Gemacht."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HAZEN-BROWN Co., Court St., Brockton, Mass. "Nu-Tread."

K & W Rubber Co., Orange St., Ashland, O.
(See page 371.)

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa. "Pluggum."

KNEAD-IT—See M. & M. Mfg. Co.

KUSHION-KORE—See American Kushion-Kore Tire Co.

M. & M. Mfg. Co., Akron, O. "Knead-it."

MASTIC—See Michelin Tire Co.

MICHELIN Tire Co., Milltown, N. J. "Mastic."

MOLD-IT—See Van Cleef Bros.

NARCO—See National Rubber Co.

NATIONAL Rubber Co., 4409 Papin St., St. Louis, Mo. "Narco."
(See page 543.)

NU-TREAD—See Hazen-Brown Co.

PAGE-LESTER Co., 125 W. Van Buren St., Chicago, Ill. "Titewad."

PLUGGUM—See Keystone Rubber Mfg. Co.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "Bestyet."

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

SELBST-GEMACHT—See Gray Specialty Co.

STICKFAST—See American Tire & Rubber Co.

TINGLEY & Co., C. O., Rahway, N. J. "C. O. T. Gum Gum."

TIRE-DOH—See Atlas Auto Supply Co.

TITEWAD—See Page-Lester Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O.

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill. "Mold-it."

WONDER WORKER—See Hall-Thompson Co.

VALVE GRINDING COMPOUNDS

AUTO Equipment Co., 32 Hollywood Ave., East Orange, N. J. "Eureka."

BORNSCHEIN & Co., John F., 6420 Sangamon St., Chicago, Ill. "E. Z.," "Peerless," "X. L."

BRIDGEPORT Wood Finishing Co., New Milford, Conn. "Lithowhite."

CARBORUNDUM Co., Niagara Falls, N. Y.

CLOVER Mfg. Co., Norwalk, Conn.

DIAMOND Pulvis Co., 1073 Fox St., New York, N. Y.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

E. Z.—See Bornschein & Co.

EUREKA—See Auto Equipment Co.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

GRYNDYN—See Stewart & Co.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker," "Quick-Kut."

HOLLINGSHEAD, Co., R. M., Camden, N. J. "Whiz."

LIGHTNING Mfg. Co., Cornish Flat, N. H.

LITHOWHITE—See Bridgeport Wood Finishing Co.

NATIONAL Valgrinok Co., 195 Church St., Newton, Mass. "Valgrinok."

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

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Not a Solid Filler but a Liquid Puncture Healer.

WEIGHT 8 Lbs. Per Car.

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Backed by a Liberal Guarantee.

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Detroit, Mich.

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Represents the highest skill known in the art of refining Lubricating Oils for automobiles and comprises all the essential requisities of a perfect motor oil.

It is made from Pennsylvania Crude Oil and is very viscous. This oil produces no carbon, no smoke, stands a low cold test and a high fire test. Suitable for all types of automobiles, motor cycles and motor boats.

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COMPOUNDS (Continued)

VALVE GRINDING COMPOUNDS (Continued)

NORTHWESTERN Chemical Co., Marietta, O. "Pioneer."
(See pages 143 and 551.)

NORTON Co., Worcester, Mass.

PEERLESS—See Bornschein & Co.

PIONEER—See Northwestern Chemical Co.

QUICK-KUT—See Hall-Thompson Co.

RAPIDCUT—See S. B. R. Specialty Co.

RIE-NIE—See Durkee-Atwood Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Rapidcut."

STEWART & Co., 171 Broadway, New York, N. Y. "Gryndyn."

VALGRINOK—See National Valgrinok Co.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

X. L.—See Bornschein & Co.

CONDENSERS

STEAM CONDENSERS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

CONES

BALL CONES

(See Cups, Ball)

CONNECTIONS

BRASS WATER CONNECTIONS

AMERICAN Brass & Iron Co., Crystal St. & Trombley Ave., Detroit, Mich.

AMERICAN Tube Bending Co., 5-9 Lawrence St., New Haven, Conn.
(See page 267.)

BRISCOE Mfg. Co., Detroit, Mich.

DETROIT Tube Products Co., 187-89 Junction Ave., Detroit, Mich.
(See page 267.)

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

STANDARD Metalwork Co., 22-40 Prospect St., Thompsonville, Conn.

STANDARD Tool & Mfg. Co., 72 Champlain St., Detroit, Mich.

TURNER Brass Works, Sycamore, Ill.

WELCH Bros., Pontiac, Mich.
(See page 441.)

WHITLOCK Coil Pipe Co., Hartford, Conn.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WILKINSON Co., Wm. H., West Medway, Mass.

GAS TUBING CONNECTIONS

COX Brass Mfg. Co., Albany, N. Y.
(See page 467.)

GOODWIN & Kintz Co., Winsted, Conn.

MORGAN, B., John St., Newport, R. I.

UNIFORM Seamless Wire Co., 71 Peck St., Providence, R. I.

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

STEERING CONNECTIONS

BILLINGS & Spencer Co., Hartford, Conn.

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 151.)

FOSTER Gear Co., Columbus, O.

HALL Automobile Specialties Co., Boston, Mass. "Hasco."

HASCO—See Hall Automobile Specialties Co.

MICHIGAN Electric Welding Co., 514 Hart Ave., Detroit, Mich.
(See page 130.)

S. & W.—See Schweppe & Wilt Mfg. Co.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich. "S. & W."

TIRE PUMP CONNECTIONS

ACORN—See Stevens & Co.

ADJUSTABLE Lighter Co., 18 Pearl St., Newton, Mass. "Larkin."

AUSTIN & Co., H. K., 23 Lincoln St., Reading, Mass.

BOSS—See Stevens & Co.

BULL DOG—See Stevens & Co.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

ECLAIR—See Stevens & Co.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

EVERTIGHT—See Smith Bros.

FRANCO Mfg. Co., 119-21 E. 16th St., Chicago, Ill.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GLOBE Mfg. Co., Battle Creek, Mich.

GRAB—See Motor Car Equipment Co.

IDEAL—See Stevens & Co.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y.
(See pages 215 and 527.)

KENO—See Stevens & Co.

LARKIN—See Adjustable Lighter Co.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. "Grab."

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOERA Mfg. Co., Waterbury, Conn.

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn.
(See page 331.)

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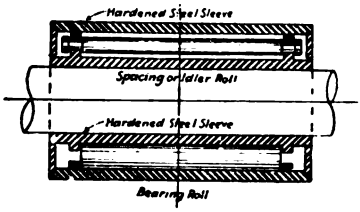
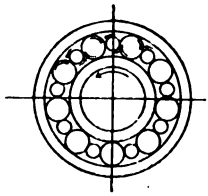
PITTSBURGH, PA.





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For all cars from a cyclecar to a five-ton truck. Also **Torsion Assemblies, Brake Rods, Tie Rods, Brake Cams,** and all similar parts. We have a new and modern daylight plant, equipped especially for the production of these parts. Six years' experience, together with our special facilities, enables us to produce highly efficient parts, and give prompt delivery. Send us your specifications.

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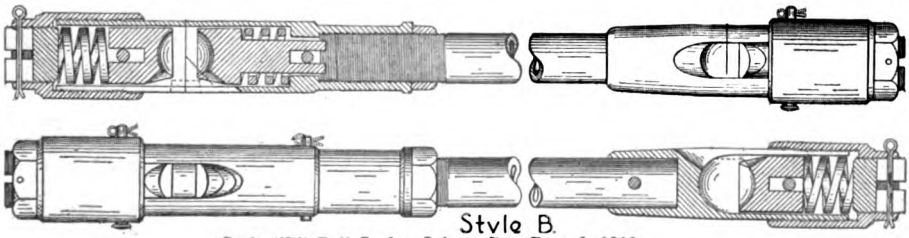

Style "B" Ball Socket Joints, Pat. Dec. 6, 1910

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CONNECTIONS (Continued)

TIRE PUMP CONNECTIONS (Continued)

PERFECT—See Youse Co.

PERFECTION—See Stevens & Co.

ROMORT Valve Co., Seattle, Wash.

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y. (See page 443.)

SMITH Bros., 467-69 Main St., Melrose, Mass. "Evertight."

STANDARD Engineering Works, 59 Social St., Woonsocket, R. I.

STEVENS & Co., 375 Broadway, New York, N. Y. "Keno." "Swivel K." "Perfection." "Boss." "Bull Dog." "Acorn." "Eclair." "Ideal." (See page 473.)

SUNDERLAND Mfg. Co., 1220 S. Michigan Ave., Chicago Ill.

SWIVEL K—See Stevens & Co.

YOUSE Co., E. S., 46 N. Fifth St., Reading Pa. "Perfect."

CONNECTORS

ACETYLENE LAMP CONNECTORS

(For Rubber Cement—See Tubing, Soft Rubber)

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

PENNFLEX—See Pennsylvania Flexible Metallic Tubing Co.

PENNSYLVANIA Flexible Metallic Tubing Co., Broad & Race Sts., Philadelphia, Pa.

BATTERY CONNECTORS

(See also Terminals, Wire)

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Bull Dog."

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich.

BECCO—See Michigan Motor Specialties Co.

BLISS-CHESTER Co., Providence, R. I. (See page 415.)

BREAZNELL, J. H., 26 Court St., Brooklyn, N. Y. (See page 153.)

BULL DOG—See American Ever Ready Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

FAHNESTOCK Electric Co., 129 Patchen Ave., Brooklyn, N. Y.

FITZGERALD Mfg. Co., Torrington, Conn. "Perfection." (See page 231.)

GOODSON—See Graham Mfg. Co.

GRAHAM Mfg. Co., 94 Point St., Providence, R. I. "Goodson."

HANDY—See Chicago Electric Mfg. Co.

HARVARD Electric Co., 525 W. Van Buren St., Chicago, Ill.

HERZ & Co., New York, N. Y. (See page 599.)

HI-PO Waterproof Battery Co., 1007 Atlantic Avenue, Brooklyn, N. Y. (See page 65.)

KINSEY Mfg. Co., Toledo, O. (See page 153.)

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind.

LOMBARDI Motor Car Co., 67-71 Minerva St., Derby, Conn.

MANHATTAN Electrical Supply Co., New York, N. Y. "Sta There." (See page 533.)

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco." (See page 523.)

MILLS—See Stackpole Carbon Co.

NATIONAL Carbon Co., Cleveland, O. (See page 65.)

PERFECTION—See Fitzgerald Mfg. Co.

SHAIN, Chas. D., Box 53, Station L., Brook- (See page 597.)

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

STA THERE—See Manhattan Electrical Supply Co.

STACKPOLE Carbon Co., St. Marys, Pa. "Mills." (See page 607.)

WESTERN Electric Co., 463 West St., New York, N. Y.

ELECTRIC LAMP CONNECTORS

ANCHOR—See Metal Specialties Mfg. Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See page 497.)

CULVER-STEARNS Mfg. Co., Worcester, Mass. (See page 243.)

HANDY—See Chicago Electric Mfg. Co.

MANHATTAN Electrical Supply Co., New York, N. Y. (See page 533.)

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Anchor."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco." (See page 153.)

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WARNE-DOUGLAS Co., Bronson, Mich.

WESTERN Electric Co., 463 West St., New York, N. Y.

CONTROLLERS

ACETYLENE LAMP CONTROLLERS

(See also Regulators, Acetylene Pressure.)

AUBEUF Co., F. H., Oneida, N. Y.

CRUM-WILEY Mfg. Co., Peru, Ind.

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Our dry battery connectors give perfect contact under excessive vibration.

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CONTROLLERS (Continued)

ELECTRIC MOTOR CONTROLLERS

(For varying speed of electric vehicles)

CUTLER-HAMMER Mfg. Co., 12th St. & St. Paul Ave., Milwaukee, Wis.

GENERAL Electric Co., Schenectady, N. Y.

WESTERN Electric Co., 463 West St., New York, N. Y.

WESTINGHOUSE Electric & Mfg. Co. (E Pittsburg), Pittsburg, Pa.

SPEED CONTROLLERS

(For keeping the speed of a car below predetermined limits)

PIERCE Speed Controller Co., Anderson, Ind.

COOLERS

WATER COOLERS

(See Radiators, Water Cooling)

COPPER

SHEET AND ROD COPPER

(See Brass, Sheet)

TUBE COPPER

(See Tubing, Brass)

CORDS

SEAMING CORDS

MEYER & Co., John C., Lowell, Mass.

CORK

BRAKE AND CLUTCH INSERTS

CORK Insert Co., 42 Batterymarch St., Boston, Mass.

COUNTER-SHAFTS

FINISHED COUNTER-SHAFTS

BALL—See New York Gear Works.

DETROIT Gear & Machine Co., 127-51 Franklin St., Detroit, Mich.

EVANS—See Merchant & Evans Co.

LEFEVER Arms Co., 1 Maitbie St., Syracuse, N. Y.

MERCHANT & Evans Co., Philadelphia, Pa. "Evans." (See page 135.)

MUNCIE Gear Works, Muncie, Ind.

NEW YORK Gear Works, 56-58 Greenpoint Ave., Brooklyn, N. Y. "Ball." (See page 593.)

RUSSEL Motor Axle Co., Detroit, Mich. (See page 155.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y. (See page 363.)

SHELDON Axle Co., Wilkes-Barre, Pa. (See page 59.)

TIMKEN-DETROIT Axle Co., Detroit, Mich.

WARNER Mfg. Co., Toledo, O. (See page 481.)

COUPLINGS

HOSE COUPLINGS

(See Clamps, Hose)

MAGNETO COUPLINGS

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

WERNER Coupling Co., 931 Dauphin St. Philadelphia, Pa.

PIPE COUPLINGS

(See Fittings, Pipe)

TUBE COUPLINGS

(See Unions, Tubing)

COVERS

AUTOMOBILE COVERS

(For covering automobiles when in the garage)

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

DAFOE-EUSTICE Co., 54 Lafayette Blvd., Detroit, Mich. "Duk-Bak."

DUK-BAK—See Dafoe-Eustice Co.

FULTON Bag & Cotton Mills, Atlanta, Ga. "Shuredry."

GORDON—See Vehicle Apron & Hood Co.

HOLCOMB Co., 105 Goffe St., New Haven, Conn.

HUMPHREYS Sons, R. A., 1021-23 Callowhill St., Philadelphia, Pa.

LANDERS, Bros. Co., Toledo, O. (See page 107.)

SHUREDRY—See Fulton Bag & Cotton Mills.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

Complete Index to Classification appears on Pages 8 to 22.

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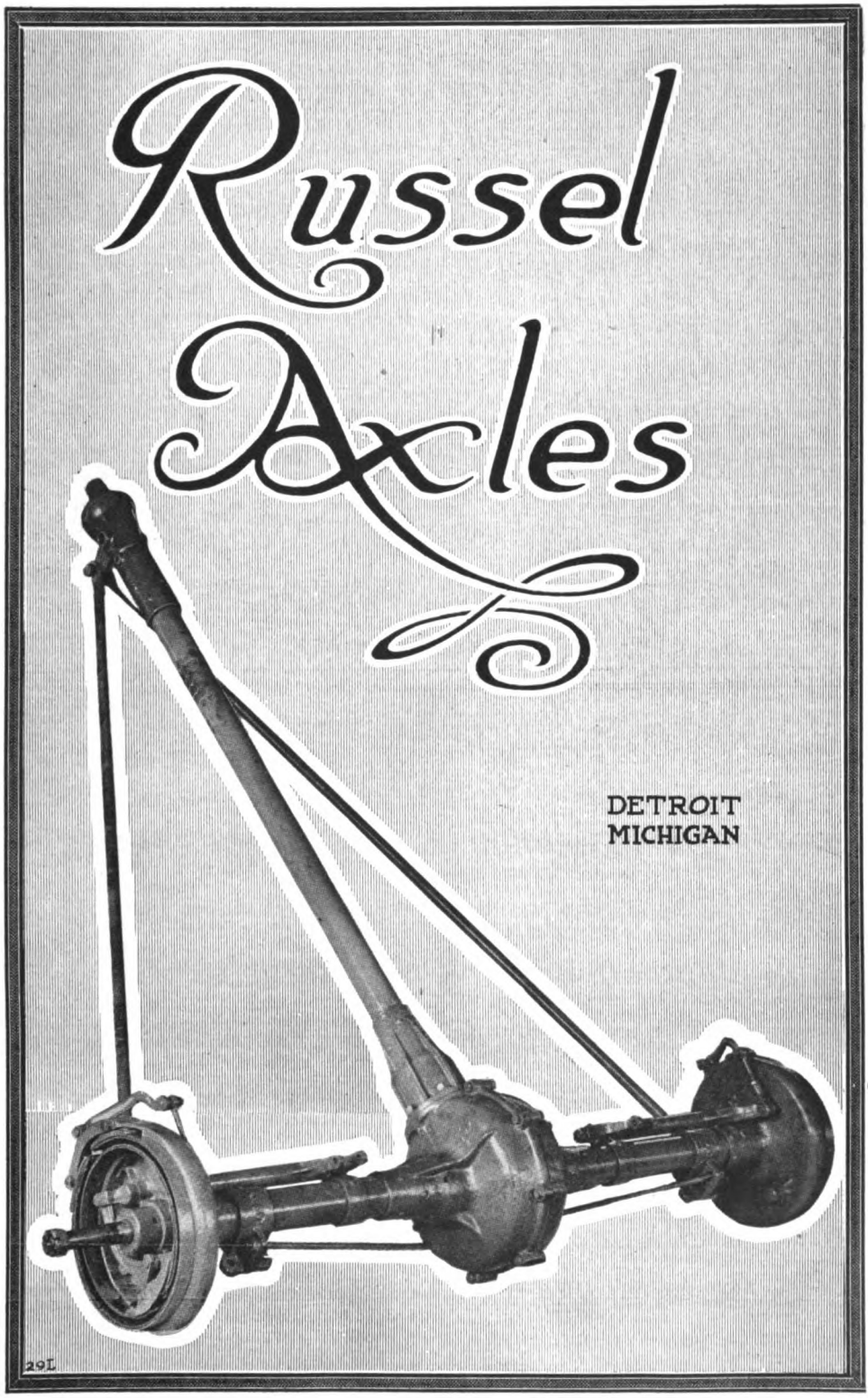

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COVERS (Continued)

LAMP COVERS

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 107.)

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill. "Chicago." "Perfection."

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

CHICAGO—See Atlas Specialty Mfg. Co.

ECONOMY Stay Co., Jefferson City, Mo.

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

GIFFORD & Son, John A., 25 Park Pl., New York, N. Y. "Tompkins."

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

HOPEWELL Bros., Newton, Mass.
(See page 671.)

LANDERS Bros. Co., Toledo, O.
(See page 107.)

NATHAN Novelty Mfg. Co., 90G. Reade St., New York, N. Y.
(See page 671.)

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

PERFECTION—See Atlas Specialty Mfg. Co.

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

TOMPKINS—See Gifford & Son.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1224 Wabash Ave., Chicago, Ill.

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

OIL HOLE COVERS

BAY State Stamping Co., 380 Chandler St., Worcester, Mass. "Bennett," "Handy."

BENNETT—See Bay State Stamping Co.

BOWEN Mfg. Co., Mechanic St., Auburn, N. Y.
(See page 165.)

CRUM-WILEY Mfg. Co., Peru, Ind.

ELLIOTT Chemical Works, Newton, Mass.

GITS Bros. Mfg. Co., Chicago, Ill.

GREER, Frederic, 525 W. Van Buren St., Chicago, Ill.

HANDY—See Bay State Stamping Co.

TUCKER, W. H. & C. F., Hartford, Conn.
(See page 157.)

WAHLSTROM Tool Co., 346 Carroll St., Brooklyn, N. Y.

WINKLEY Co., Detroit, Mich.
(See page 89.)

PAPER SHIPPING COVERS

INSURANCE Packing Mills, 411 Court St., Brockton, Mass.

SEINSHEIMER Paper Co., York St. & McLean Ave., Cincinnati, O.

LEATHER MAGNETO COVERS

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

BAUER-LEWIS Co., 383 Holden Ave., Detroit, Mich.

CAMPBELL—See Perkins Campbell Co.

DAFOE-EUSTACE Co., 54 Lafayette Blvd., Detroit, Mich. "Duk-Bak."

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich.
(See page 83.)

DUK-BAK—See Dafoe-Eustice Co.

ECONOMY Stay Co., Jefferson City, Mo.

FRANCKE—See Smith-Serrell Co.

GILBERT Mfg. Co., New Haven, Conn.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HOOVER Co., W. H., New Berlin, O.

LEATHER Products Co., 2268 Spring Grove Ave., Cincinnati, O.

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell."
(See page 405.)

REINHOLD Belting & Supply Co., 174 W. 65th St., New York, N. Y.

SMITH-SERRELL Co., 90 West St., New York, N. Y. "Francke."

RADIATOR AND HOOD COVERS

(To prevent the water freezing in cold weather)

ANTIDAM—See Glover Equipment Co.

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 107.)

ATLAS Specialty Mfg. Co., 217-219 N. Michigan Ave., Chicago, Ill.

AUTO Cape Top Co., 2334 Michigan Ave., Chicago, Ill.

AYRES & Sons, Wm., Cumberland & Third Sts., Philadelphia, Pa.

BONDY Mfg. Co., 3112 Euclid Ave., Cleveland, O. "Tesmer," "Imperial."

BOYER-SCHLISKE Co., 1171 Van Dyke Ave., Detroit, Mich.

DETROIT Slip Cover Co., 1225 Woodward Ave., Detroit, Mich.
(See page 537.)

GILLIAM Mfg. Co., Canton, O.

GLOVER Equipment Co., Indianapolis, Ind. "Antidam."
(See page 367.)

GORDON—See Vehicle Apron & Hood Co.

IMPERIAL—See Bondy Mfg. Co.

J-M KEYSTONE—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M Keystone."

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COMPRESSION APPLIED WITH THE FINGERS. NO SPRINGS AND WASHERS TO DEPRESS WHEN FEEDING THE LUBRICANT

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Locks automatically. Cup member has internally milled threads to gauge limit, insuring interchangeability. Made in three sizes —¾", 1" and 1¼". Send us your specifications for

SPRING SHACKLE BOLTS

We will quote prices on bolts fitted with our lock cups or plain cups or will furnish the cup with lock for you to fit to the shackle bolt. We are prepared to furnish cups without bases from pressed sheet brass with milled threads in ¾" x 24 Pi, 1" x 24 Pi and 1¼" x 24 Pi inside diameter + Nos. 000, 00 and 0 sizes.

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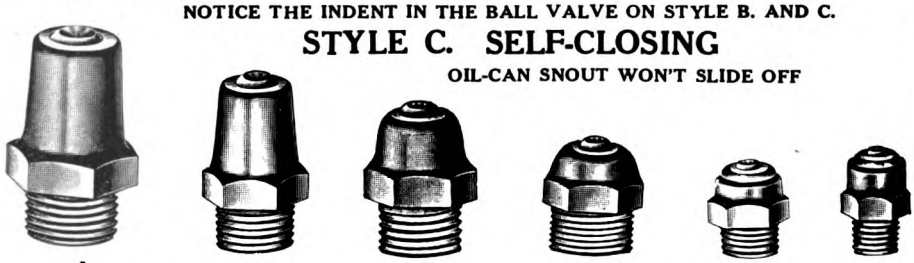

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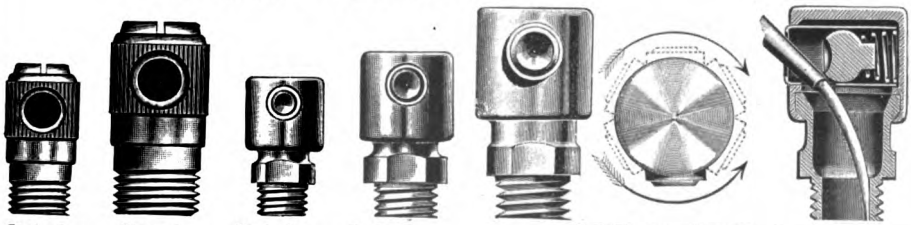

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PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

SIEDER Mfg. Co., 31-33 E. Woodbridge St., Detroit, Mich.

TESMER—See Bondy Mfg. Co.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

VEHICLE Top & Supply Co., 3414 Lindell Ave., St. Louis, Mo. "Vesco."

VESCO—See Vehicle Top & Supply Co.

RUBBER STEERING WHEEL COVERS OR GRIPS

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

CANCOS Mfg. Co., 146 N. Second St., Philadelphia, Pa. "Steerease."

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

EZE-GRIP—See Hayne-Surridge Auto Goods Co.

GORDON—See Vehicle Apron & Hood Co.

HAYNE-SURRIDGE Auto Goods Co., 1017 Lucas Ave., St. Louis, Mo. "Eze-Grip."

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

PARKER-STEARNS & Co., 286 Sheffield Ave., Brooklyn, N. Y.

STEEREASE—See Cancos Mfg. Co.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

SLIP COVERS

(See also Tops, Automobile)

CAMPBELL—See Perkins Campbell Co.

CENTRAL Auto Top Co., 330 N. Illinois St., Indianapolis, Ind.

DETROIT Slip Cover Co., 1225 Woodward Ave., Detroit, Mich. (See page 537.)

GATES Mfg. Co., Indianapolis, Ind.

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell." (See page 405.)

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

STARTING CRANK COVERS

(See Holders, Starting Crank)

STEERING KNUCKLE COVERS

(See Boots, Steering Knuckle)

TIRE COVERS

(See Cases, Tire and Tube)

TOP COVERS

(See also Tops, Automobile)

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill. "Chicago."

B. E. Mfg. Co., 38 White St., New York, N. Y.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

CHICAGO—See Atlas Specialty Mfg. Co.

DETROIT Slip Cover Co., 1225 Woodward Ave., Detroit, Mich. (See page 537.)

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

GLOVER Equipment Co., Indianapolis, Ind. (See page 307.)

GORDON—See Vehicle Apron & Hood Co.

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

MICHIGAN Top Co., 313 Riopelle St., Detroit, Mich.

MILWAUKEE Trimming Co., 549 E. Water St., Milwaukee, Wis.

NATHAN Novelty Mfg. Co., 90 G. Reade St., New York, N. Y. (See page 671.)

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

SPRINGFIELD Auto Top & Upholstering Co., 224-30 Dwight St., Springfield, Mass.

STAR Storm Front Co., Canal St., Troy, O.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

VEHICLE Top & Supply Co., 3414 Lindell Ave., St. Louis, Mo. "Vesco."

VESCO—See Vehicle Top & Supply Co.

CRANKS

SAFETY STARTING CRANKS

CLARK Crank Co., Muncie, Ind.

PERKINS & Son, B. F., 2 Crescent St., Holyoke, Mass.

PRESTON Auto Improvement Co., 27 School St., Boston, Mass.

PROSSER Engineering Co., 2106 W. Superior Ave., Cleveland, O.

R. & B. Mfg. Co., 5525 Woodland Ave., Philadelphia, Pa. "Rohrer."

ROHRER—See R. & B. Mfg. Co.

WINK Mfg. Co., 2100 W. Superior Ave., Cleveland, O.

CRANKSHAFTS

FINISHED OR MACHINED CRANKSHAFTS

(For Crankshafts in the rough—See Forgings, Drop)

ATLAS Mfg. Co., Fostoria, O. (See page 163.)

AUTO Crankshaft Co., 192-96 Piquette Ave., Detroit, Mich. (See page opposite last page.)

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TRADE MARK

THE APPLE ELECTRIC CO.

16 CANAL ST., DAYTON, O.

AMERICA'S LEADING MANUFACTURER OF

Electrical Equipment

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Electric Engine Starters
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Electric Lighting Outfits
FOR MOTOR BOATS

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Philadelphia.....210-212 N. 13th St.
Boston, Mass....180 Massachusetts Ave.
Atlanta, Ga.....10-12 E. Harris St.
Chicago, Ill.....64-72 E. 14th St.
Kansas City, Mo.....1823 Grand Ave.
Los Angeles, Cal.....1228 So. Olive St.
Seattle, Wash.....1028 Broadway
San Francisco, Cal.....1028 Geary St.
London, England.....6 City Road
Buenos Aires.....964 Calle Belgrano
Detroit, Mich.....972 Woodward Ave.

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CRANKSHAFTS (Continued)

FINISHED OR MACHINED CRANKSHAFTS (Continued)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

FORE River Shipbuilding Corp., Quincy, Mass.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 447.)

JACKSON Motor Shaft Co., Jackson, Mich.
(See page 101.)

JOLIET Forge Co., Irving & Franklin Sts., Joliet, Ill.

KRUPP—See Prosser & Son.

LELAND & Co., W. H., 1025 Southbridge St., Worcester, Mass.

MICHIGAN Crank Shaft Co., Lansing, Mich.
(See page 165.)

MUSKEGON Motor Specialties Co., Water St., Muskegon, Mich.
(See page 531.)

NATIONAL Engineering Co., Saginaw, Mich.
(See page 581.)

NORTON Grinding Co., New Bond St., Worcester, Mass.

OBENBERGER Drop Forge Co., Cudahy, Wis.

PARK Drop Forge Co., Cleveland, O.
(See page 163.)

PENINSULA Auto Parts Co., 46 Champlain St., Detroit, Mich.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 353.)

TINDELL-MORRIS Co., Eddystone, Pa.

UNION Drop Forge Co., 358 W. Indiana St., Chicago, Ill.

WILCOX-McKIM Co., Saginaw, Mich.
(See page 197.)

WITTEMAN Co., A. P., Fourth & Booth Sts., Chester, Pa.

WYMAN & Gordon Co., Worcester, Mass.
(See page 161.)

CUPS

BALL CUPS AND CONES

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 261.)

BOSSERT Co., Utica, N. Y.
(See page 233.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

DETROIT Screw Works, Detroit, Mich.
(See page 661.)

GIER & Dall Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 91.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 429.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., Elyria, O.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 169.)

OIL AND GREASE CUPS

(See also Lubricators; also Covers, Oil Hole)

ACTIVE—See Sherman Mfg. Co.

AGNER Co., Raymond C., Burlington, Wis. "Simplex."

AJAX—Se Allen Mfg. Co.

ALBANY Lubricating Co., 708-10 Washington St., New York, N. Y. (Grease Cups only.)

ALLEN Mfg. Co., W. D., 135 W. Lake St., Chicago, Ill. "Czar," "Columbia," "Peerless," "Gibbs," "Ajax," "Polar," "Pawnee."

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

AMERICAN Lubricator Co., Summit Ave. & Wabash Ry., Detroit, Mich.

AMERICAN Pin Co., Waterbury, Conn.

AMERICAN Stamping Co., Battle Creek, Mich.

ARROW—See Long Bros.

BAY State Stamping Co., 380 Chandler St., Worcester, Mass.

BESLY & Co., Charles H., Chicago, Ill. "Helmet."

BOWEN Mfg. Co., Mechanic St., Auburn, N. Y. "Empress."
(See page 165.)

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

BUFFALO—See Sherwood Mfg. Co.

CAMDEN—See Lindholm Metal Stamping Co.

CHICAGO—See Ohio Injector Co.

COLONIAL—See Powell Co.

COLUMBIA—See Allen Mfg. Co.

CRANE Co., 836 S. Michigan Ave., Chicago, Ill.

CRUM-WILEY Mfg. Co., Peru, Ind. "Ideal," "Perfection."

CUTTER—See Long Bros.

CZAR—See Allen Mfg. Co.

DETROIT Lubricating Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

EDELMANN & Co., E. 225 W. Illinois St., Chicago, Ill.

EMPRESS—See Bowen Mfg. Co.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

GENERAL Pressed Metal Co., American & Diamond Sts., Philadelphia, Pa.

GIBBS—See Allen Mfg. Co.

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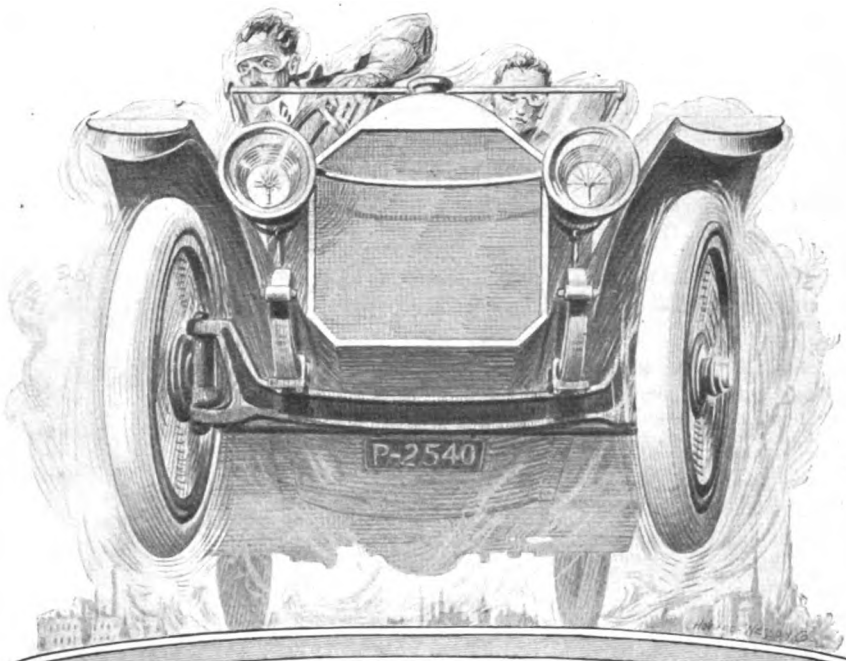

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CUPS (Continued)

OIL AND GREASE CUPS (Continued)

GITS Bros. Mfg. Co., Chicago, Ill.

GREER, Frederic, 525 W. Van Buren St., Chicago, Ill.

GUARDIAN—See Sherman Mfg. Co.

HANS Motor Equipment Co., La Crosse, Wis.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HELMET—See Besly & Co.

HENRY Mfg. & Grease Cup Co., Terre Haute, Ind.
(See page 551.)

IDEAL—See Crum-Wiley Mfg. Co.

IDEAL—See Lunkenheimer Co.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

JOSEPH—See Lindholm Metal Stamping Co.

KELLY & Jones Co., Greensburg, Pa.

LINDHOLM Metal Stamping Co., 111 Erie St., Camden, N. J. "Joseph," "Vale," "Camden," "Madeira," "McKee."
(See page 105.)

LION—See Lunkenheimer Co.

LONG Bros., Broadway & Buckeye St., Kokomo, Ind. "Arrow," "Cutter."

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O. "Ideal," "Lion," "Pioneer," "Royal," "Sentinel," "Tiger."

M & E—See Merchant & Evans Co.

McKEE—See Lindholm Metal Stamping Co.

McRAE & Roberts Co., 221-35 Campbell Ave., Detroit, Mich.

MADEIRA—See Lindholm Metal Stamping Co.

MECCA—See Powell Co.

MECHANICAL & Electrical Mfg. Co., 2227 Prairie Ave., Chicago, Ill.
(See page 230.)

MERCHANT & Evans Co., Philadelphia, Pa. "M & E."
(See page 135.)

MICHIGAN Lubricator Co., 661-73 Beaubein St., Detroit, Mich.

MILLER & Starr Co., 250 Green St., Brooklyn, N. Y.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

MOGUL—See Powell Co.

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

NIAGARA—See Sherwood Mfg. Co.

OHIO Injector Co., Wadsworth, O. "Chicago."

PAWNEE—See Allen Mfg. Co.

PEERLESS—See Allen Mfg. Co.

PENBERTHY Injector Co., Detroit, Mich. "Sterling."

PERFECT—See Sherman Mfg. Co.

PERFECTION—See Crum-Wiley Mfg. Co.

PIONEER—See Lunkenheimer Co.

POLAR—See Allen Mfg. Co.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O. "Mogul," "Progress," "Renown," "Vanguard," "Colonial," "Mecca,"

PREMIUM—See Sherman Mfg. Co.

PROGRESS—See Powell Co.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

RENOWN—See Powell Co.

RICH Mfg. Co., 370 Atlantic Ave., Boston, Mass.

ROYAL—See Lunkenheimer Co.

SENTINEL—See Lunkenheimer Co.

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich. "Premium," "Perfect," "Guardian," "Active."

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y. "Niagara," "Buffalo."

SIMPLEX—See Agner Co.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STERLING—See Penberthy Injector Co.

SWIFT Lubricator Co., Elmira, N. Y.

TIGER—See Lunkenheimer Co.

TUCKER, W. H. & C. F., Hartford, Conn.
(See page 157.)

VALE—See Lindholm Metal Stamping Co.

VANGUARD—See Powell Co.

WALWORTH Mfg. Co., Boston, Mass.
(See page 559.)

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

WINKLEY Co., Detroit, Mich.
(See page 80.)

ZERK Mfg. Co., Cleveland, O.

SPRING KEY PRIMING CUPS

(For ordinary priming cups—See Cocks, Standard Pet)

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

BECCO—See Michigan Motor Specialties Co.

CRUM-WILEY Mfg. Co., Peru, Ind.

DETROIT Brass Works, 1304 Brooklyn Ave., Detroit, Mich.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco."
(See page 523.)

NATIONAL Brass Mfg. Co., 191-93 Mill St., Rochester, N. Y.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

SHORE Instrument & Mfg. Co., 555-57 W. 22d St., New York, N. Y. "Sico."

SICO—See Shore Instrument & Mfg. Co.

STANDARD Brass Works, 528-30 Woodbridge St., E., Detroit, Mich.

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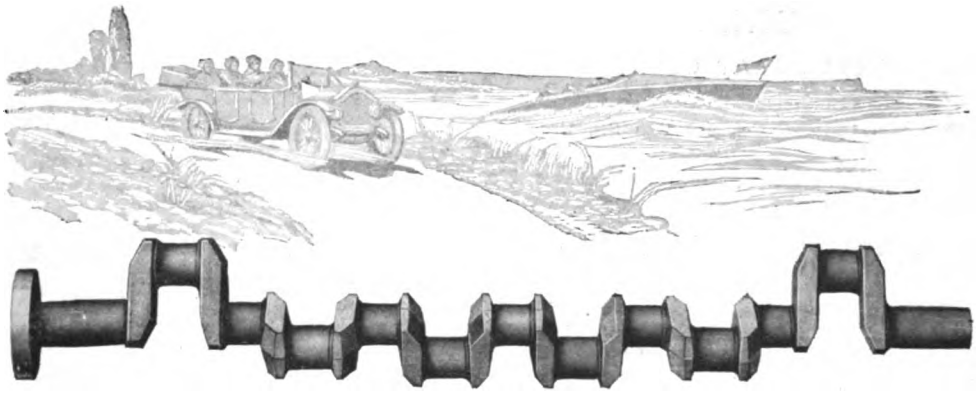

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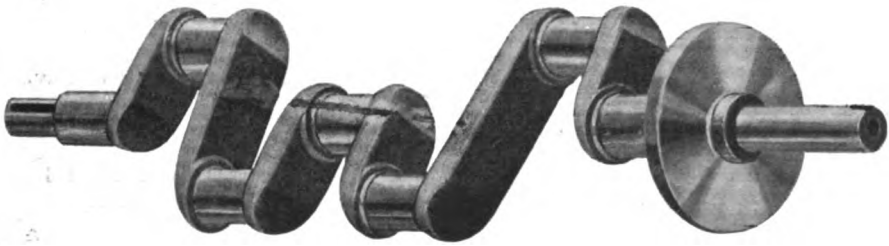

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CURTAINS

SPECIAL TOP CURTAINS

COLLINS—See Novelty Leather Works.

DETROIT Flash Curtain Co., 613 Free Press Bldg., Detroit, Mich.
(See page 553.)

JIFFY Auto Curtain Co., Ford Bldg., Detroit, Mich.

NOVELTY Leather Works, Dept. E., Jackson, Mich. "Collins."
(See page 443.)

SCOTT—See Star Storm Front Co.

STAR Storm Front Co., Canal St., Troy, O. "Scott."

CUSHIONS

SPECIAL SEAT CUSHIONS

(For ordinary cushions—See Bodies; also Tops)

PNEUMATIC Mfg. Co., 526 17th St., Brooklyn, N. Y.

CYLINDERS

FINISHED OR MACHINED CYLINDERS

(For cylinder castings in the rough—See Casting, Gray Iron)

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.
(See pages 574 and 575.)

FULTON Foundry & Machine Co., 25 Furman St., Brooklyn, N. Y.

MUNCIE Foundry & Machine Co., Muncie, Ind.
(See page 539.)

WAINWRIGHT & Son, W. W., Connersville, Ind.
(See page 307.)

DASHES

LEATHER DASHES

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

PETERS & Herron Dash Co., Gift & Culbertson Sts., Columbus, O.

METAL DASHES

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

BRISCOE Mfg. Co., Detroit, Mich.

HAYES Mfg. Co., Detroit, Mich.
(See pages 78 and 79.)

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

MULLINS Co., W. H., 182 Franklin St., Salem, O.

WOOD DASHES

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J.
(See page 83.)

BENHAM Mfg. Co., 1882 Mt. Elliott Ave., Detroit, Mich.

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

DETROIT Auto Dash Co., 519-21 Beaubien St., Detroit, Mich.
(See page 427.)

EGGERS Veneer Seating Co., F., Two Rivers, Wis.

HANSON-WARD Veneer Co., Bay City, Mich.
(See page 515.)

HARTFORD Pattern & Model Co., 120 Allyn St., Hartford, Conn.

INDIANA Veneer & Panel Co., New Albany, Ind.

LOUISVILLE Veneer Mills, 1122-40 Fulton St., Louisville, Ky.

NEW Jersey Veneer Co., 258 W. Railway Ave., Paterson, N. J.

STANDARD Cabinet Mfg. Co., Peru, Ind.

WIDMAN & Co., J. C., 14th, 15th Sts. & G. T. Ry., Detroit, Mich.

WISCONSIN Seating Co., New London, Wis.

DIMMERS

HEADLIGHT DIMMERS OR SHADES

ECLIPSE Headlight Shade Co., 505 S. Clinton St., Syracuse, N. Y.

ESSENKAY Products Co., 1125-29 W. 37th St., Chicago, Ill.

DIM-A-LITE—See Pellets Magneto Exchange.

DIMIT—See Suburban Lighting & Gas Engine Co.

LUYTIES, Otto, 546 Fifth Ave., New York, N. Y.

PELLETS Magneto Exchange, 1463 Michigan Ave., Chicago, Ill. "Dim-a-Lite."

SUBURBAN Lighting & Gas Engine Co., Summit & Lagrange Sts., Toledo, O. "Dimit."

TOBEY, Wm. L., 9 Lewis St. (E. Boston), Boston, Mass.

DISCS

RADIATOR DISCS OR FINS

ACKLIN Stamping Co., Toledo, O.

BRISCOE Mfg. Co., Detroit, Mich.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 169.)

STEEL CLUTCH DISCS

ACKLIN Stamping Co., Toledo, O.

AMERICAN Die & Tool Co., Second & Buttonwood Sts., Reading, Pa.

BOSSERT Co., Utica, N. Y.
(See page 233.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CROSBY Co., Buffalo, N. Y.

DISSTON & Sons, Henry (Tacony), Philadelphia, Pa.

EMERSON, Smith & Co., Beaver Falls, Pa.

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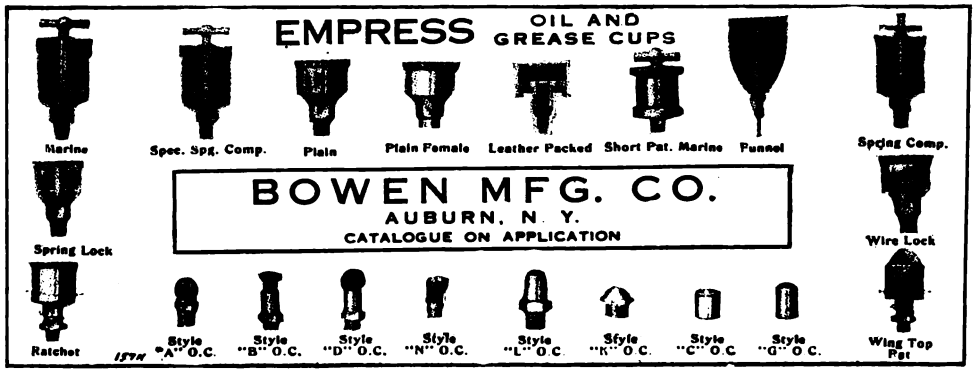

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DISCS (Continued)

STEEL CLUTCH DISCS (Continued)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

OLDHAM & Sons, Joshua, 114-18 Liberty St., New York, N. Y.

SIMONDS Mfg. Co., North St., Fitchburg, Mass.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

DISTRIBUTERS

SPARK DISTRIBUTERS

(See Timers, Ignition)

DRESSING

CLUTCH AND BELT DRESSING

ARMIGER Chemical Co., 2155-57 Austin Ave., Chicago, Ill. "Rex."

BORNSCHEIN & Co., John F., 6420 Sangamon St., Chicago, Ill. "Sampson."

CLEVELAND Auto-Clutch Dressing Co., Cleveland, O. "Slipnot."

CLUTCH-A-RENO—See Dolt & Dolt.

DOLT & Dolt, 90 West St., New York, N. Y. "Clutch-a-Reno."

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Velvet."

GRIP-TITE Co., George & Church Sts., New Brunswick, N. J.

NORTHWESTERN Chemical Co., Marietta, O. "Pioneer."
(See pages 143 and 551.)

OWL—See Western Chemical Mfg. Co.

PIONEER—See Northwestern Chemical Co.

REX—See Armiger Chemical Co.

RIE-NIE—See Durkee-Atwood Co.

SAMPSON—See Bornschein & Co.

SLIPNOT—See Cleveland Auto-Clutch Dressing Co.

VELVET—See Gray Specialty Co.

WESTERN Chemical Mfg. Co., 151 Sixth St., Milwaukee, Wis. "Owl."

LEATHER DRESSING

ALCOVIE—See Matt & Co.

ALDER Chemical Co., Mt. Vernon, N. Y. "Star."

AMERICAN—See Weiss & Son.

ARMIGER Chemical Co., 2155-57 Austin Ave., Chicago, Ill. "Rex."

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ARSENAL Varnish Co., Rock Island, Ill.

B-BRITE—See Polish Products Co.

BANNER—See Wadsworth-Howland Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BAY STATE—See Wadsworth, Howland & Co.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

CENTURY—See Arnstein, Eugene.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill. "King."

COL-R-OLE—See Rub-On Mfg. Co.

COLUMBUS Varnish Co., Columbus, O.

CUMMER Products Co., 2150 W. 15th St., Cleveland, O. "Perfect Auto Gloss."

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers."

DIX Mfg. Co., Lewistown, Pa.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

EBERSON Paint Co., 18th & Pine Sts., St. Louis, Mo. "Leather-Lac."

EVERNEW—See Felton, Sibley & Co.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa. "Evernew."

GLAZENE Co., 1330 W. Jackson Blvd., Chicago, Ill.

GLO Co., 38 Heddon Pl., East Orange, N. J.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HAUTHAWAY & Sons, C. L., 646 Congress St., Boston, Mass.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

JEWELL Mfg. Co., 21st St. & Marshall Blvd., Chicago, Ill. "Nelsons."

JOHNSTON Paint Co., R. F., Cincinnati, O. "Leather Lac," "Top Fix."
(See page 167.)

KING—See Chicago White Lead & Oil Co.

KORINE Carbon Remover Co., 114 Friend St., Amesbury, Mass. "Leather-Life."

LAWRENCE & Co., W. W., Pittsburg, Pa.

LEAKANOT—See National Rubber Co.

LEATH-R-NU—See Nu-Back Mfg. Co.

LEATHER-LAC—See Eberson Paint Co.

LEATHER LAC—See Johnston Paint Co.

LEATHER-LIFE—See Korine Carbon Remover Co.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

McDOUGALL Varnish Co., Buffalo, N. Y.

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TO
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- SLIKUP Metal Polish
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- SLIKUP Enamel Top Dressing
- SLIKUP Mohair Top Cleaner
- SLIKUP Hand Cleaner
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(Lasts six months.)
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(Heat Resisting.)
HARD RUBBER ENAMEL
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RIENIE VALVE GRINDING COMPOUND
(Grinds Fast. Leaves smoothest seat.)
MOHAIR WATERPROOFING & DRESSING
(Guaranteed not to stiffen Mohair)
LEATHER & PANTASOTE DRESSING
MOHAIR CLEANER
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(Preserves the rubber, makes the tires look new)
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(Complete assortment of paints for Ford cars.)

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MINNEAPOLIS, MINN. U.S.A.

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DRESSING (Continued)

LEATHER DRESSING (Continued)

MARTIN, L. G., 3923 Forbes St., Pittsburg, Pa.

MATT & Co., F., 491 Washington St., Newark, N. J. "Alcovie."

MECHEM, J. L., 118 E. Jackson St., Centerville, Ia.

MILLER Co., Frank, 349-51 W. 26th St., New York, N. Y.

MONTGOMERY-WASHBURN Co., Saugerties, N. Y.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

NATIONAL Rubber Co., 4400 Papin St., St. Louis, Mo. "Leakanot."
(See page 543.)

NATIONAL Sales Co., 2431 Vine St., Kansas City, Mo. "3-W."

NELSONS—See Jewell Mfg. Co.

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

NORTHWESTERN Chemical Co., Marietta, O. "Pioneer."
(See pages 143 and 551.)

NOUVEAU—See Rodriguez, R. E.

NU-BACK Mfg. Co., St. Louis, Mo. "Leath-R-Nu."

NU-LETHER—See Oriental Enamel Co.

ORIENTAL Enamel Co., 963 W. Sixth St., Long Beach, Cal. "Nu-lether."

PERFECT AUTO GLOSS—See Cummer Products Co.

PIONEER—See Northwestern Chemical Co.

POLISH Products Co., 606 Broadway, Kansas City, Mo. "B-Brite."

REX—See Armiger Chemical Co.

RIE-NIE—See Durkee-Atwood Co.

RODRIGUEZ, R. E., 56-58 Warren St., New York, N. Y. "Nouveau."

ROGERS—See Detroit White Lead Works.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y. "Rub-R-Tite." "Col-R-Ole."

RUB-R-TITE—See Rub-On Mfg. Co.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo.

SCHMOEGER, Frederic A., Sterling, Ill. "Sterling."

STAR—See Alder Chemical Co.

STERLING—See Schmoeger, Frederic A.

3-W—See National Sales Co.

THUMB, E. W., 872 Orleans St., Chicago, Ill.

TOP FIX—See Johnston Paint Co.

VICTOR Mfg. Co., 72 Chestnut St., Newark, N. J.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Banner."

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass. "Bay State."

WEISS & Son, Chas., 4715-19 Cottage Grove Ave., Chicago, Ill. "American."

WEST Mfg. Co., 120-22 N. Madison St., Rockford, Ill.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

ZINSSER & Co., W., 195 William St., New York, N. Y.

MOHAIR TOP DRESSING

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 167.)

COLEMAN'S — See Virginia Waterproofing Corp.

COLUMBUS Varnish Co., Columbus, O "Peerless."

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

EVERNEW—See Felton, Sibley & Co.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa. "Evernew."

GLAZENE Co., 1330 W. Jackson Blvd., Chicago, Ill.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

LEATH-R-NU—See Nu-Back Mfg. Co.

MILLER Co., Frank, 349-51 W. 26th St., New York, N. Y.

NATIONAL Sales Co., 2431 Vine St., Kansas City, Mo. "3-W."

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

NU-BACK Mfg. Co., St. Louis, Mo. "Leath-R-Nu."

NU-LETHER—See Oriental Enamel Co.

ORIENTAL Enamel Co., 963 W. Sixth St., Long Beach, Cal. "Nu-lether."

PEERLESS—See Columbus Varnish Co.

PRICE Fire & Water Proofing Co., Poughkeepsie, N. Y.

RIE-NIE—See Durkee-Atwood Co.

SLIKUP—See Arnold, N. B.

VIRGINIA Waterproofing Corp., Arcade Bldg., Norfolk, Va. "Coleman's."

WONDER Worker—See Hall-Thompson Co.

DRUMS

PRESSED STEEL BRAKE DRUMS

(For Cast Drums—See Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 233.)

CROSBY Co., Buffalo, N. Y.

DAVIES-BACH Mfg. Co., Davies Bldg., Alliance, O.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

FEDERAL Pressed Steel Co., Milwaukee, Wis.
(See page 169.)

GIER & Dail Mfg. Co., Lansing, Mich.

Complete Index to Classification appears on Pages 8 to 22.

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HIGHEST QUALITY

PRESSED STEEL

Rear Axle Housings
Ball Cups
Shims
Segments
Bicycle Fittings

Brake Drums
Brake Guides
Covers
Quadrants
Wrenches
Joint Cases

FOR AUTOMOBILES

We also cold draw seamless, stamp, press and form parts from sheet brass, bronze, copper, aluminum, etc., as well as sheet steel for any purpose.

Worcester Pressed Steel Company

Main Office and Factory

Worcester, Massachusetts

San Francisco Office, 333-349 Rialto Building.
Portland, Oregon, Office, 520 Swetland Bldg.
Chicago Office, 1243 Peoples Gas Bldg.
Detroit Office, 1417 Ford Bldg.
New York Office, 154 Nassau St.
Philadelphia Office, 418 Land Title Bldg.

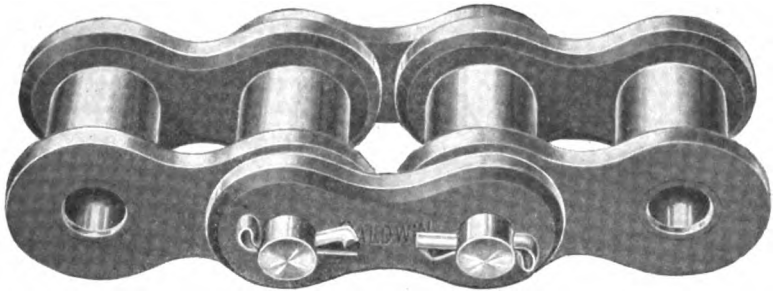
Federal Pressed Steel Company

Milwaukee, Wis.

Seamless steel products:

GASOLINE TANKS
STARTER TANKS
BRAKE DRUMS

BALDWIN DRIVE CHAINS



are made both **RIVETED** and **DETACHABLE.**

The high quality of material and workmanship enables us to produce chains of superior strength and durability. **Send for samples.**

We are prepared to quote interesting prices on Sprockets for sample lots or in quantity. Write us.

CHAINS BALDWIN SPROCKETS

BALDWIN CHAIN & MFG. CO.

WORCESTER, MASS.

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C. J. Iven, Rochester, New York.
M. A. Bryte, 788 Mission St., San Francisco, Cal.
C. D. Schmidt, 276 Canal St., New York.
F. Shirley Boyd, 903 Boylston St., Boston, Mass.

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DRUMS (Continued)

PRESSED STEEL BRAKE DRUMS (Continued)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

GREENVILLE Metal Products Co., Greenville, Pa.

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O. (See page 321.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KELSEY Wheel Co., Detroit, Mich.

KINSEY Mfg. Co., Toledo, O. (See page 153.)

KONIGSLOW Mfg. Co., Otto., Cleveland, O.

PRESSED Steel Tank Co., West Allis, Wis.

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 169.)

DUSTERS

MOTORISTS DUSTERS

(See Clothing, Motorists)

DYE

TOP LINING DYE

RUB-ON Mfg. Co., 89 Brayton St., Buffalo. N. Y.

DYNAMOMETERS

ELECTRIC TESTING DYNAMOMETERS

ALDEN, Geo. I., 48 Queen St., Worcester, Mass.

DIEHL Mfg. Co., Elizabethport, N. J. (See page 453.)

SPRAGUE Electric Works, 527 W. 34th St., New York, N. Y.

HYDRAULIC TESTING DYNAMOMETERS

HERSCHELL-SPILLMAN Co., North Tonawanda, N. Y. (See page 303.)

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. (See page 523.)

STANDARD Motor Construction Co., 172-80 Whiton St., Jersey City, N. J.

DYNAMOS

BATTERY CHARGING DYNAMOS AND MOTOR GENERATORS

ALLIS-CHALMERS Mfg. Co., Milwaukee, Wis.

C & C—See Garwood Electric Co.

CROCKER-WHEELER Co., Ampere, N. J.

DIEHL Mfg. Co., Elizabethport, N. J. (See page 453.)

ECK Dynamo & Motor Co., Belleville, N. J. (See page 400.)

FAIRBANKS Morse & Co., Wabash Ave. & Eldredge Pl., Chicago, Ill.

GARWOOD Electric Co., Garwood, N. J. "C & C."

GENERAL Electric Co., Schenectady, N. Y.

HOLTZER-CABOT Electric Co., Brookline, Mass. (See page 231.)

KENDRICK & Davis Co., Lebanon, N. H.

LINCOLN Electric Co., 38th St. & Kelley Ave., N. E., Cleveland, O.

PEERLESS Electric Co., Warren, O.

ROBBINS & Myers Co., Lagonda Ave., Springfield, O.

ROTH Bros. & Co., Adams & Loomis Sts., Chicago, Ill.

SPRAGUE Electric Works, 527 W. 34th St., New York, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTERN Electric Co., 463 West St., New York, N. Y.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

ELECTRIC LIGHTING AND BATTERY CHARGING DYNAMOS

A. B. Mfg. Co., Poughkeepsie, N. Y.

ADAMS-BAGNALL Electric Co., Cleveland, O. (See page 243.)

ADAMS & Westlake Co., Chicago, Ill. "Adlake." (See page 245.)

ADLAKE—See Adams & Westlake Co.

APELCO—See Apple Electric Co.

APPLE Electric Co., 16 Canal St., Dayton, O. "Apelco." (See page 159.)

AUTO-LITER—See Electric Auto-Lite Co.

AUTODYNE—See Bijur Motor Lighting Co.

BIJUR Motor Lighting Co., 15th St. & River Front, Hoboken, N. J. "Autodyne."

BRIGGS Magneto Co., Elkhart, Ind. "Maglite."

CROCKER-WHEELER Co., Ampere, N. J.

DA-LITE—See Dayton-Dick Co.

DAYTON-DICK Co., Quincy, Ill. "Da-Lite." (See page 409.)

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DEACO—See Detroit Electric Appliance Co.

DEAN Electric Co., 2515 Taylor St., Elyria, O. "Dynalux." (See page 138.)

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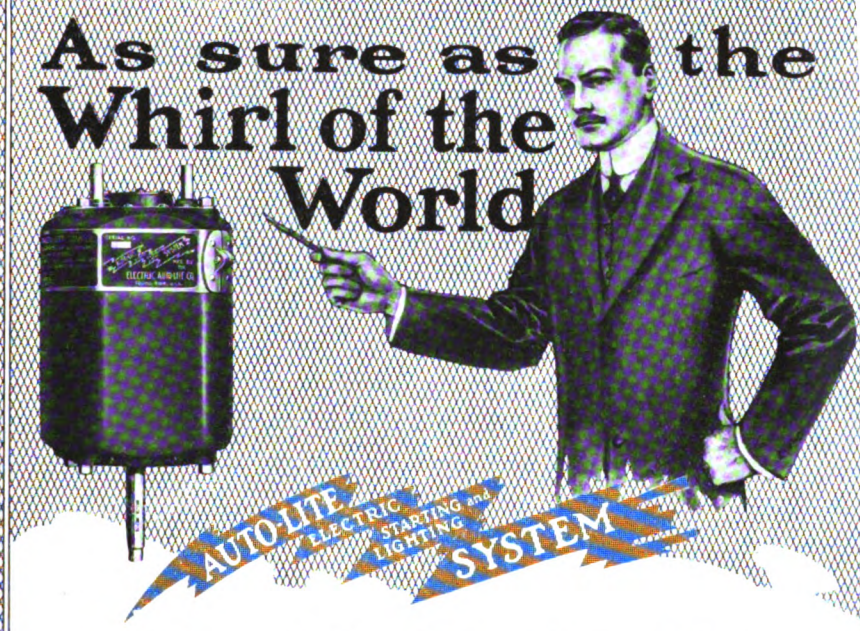

A *Capable* Starting Motor

SO rugged and powerful that it will spin a big six-cylinder automobile engine faster than 100 revolutions per minute with the ease of a Hercules and on less than 100 amperes of current, the Auto-Lite Starting motor can be relied upon to perform its function faithfully and fully—compelling positive starting day in and day out, winter or summer.

Strong—compact—*capable*—fully enclosed—protected from the deteriorating effect of water, dirt and grease, it is built for hard, continuous service and should last longer than the car to which it is attached.

Look for this efficient starter on your 1914 car.

The manufacturing and financial facilities of the Electric Auto-Lite Company are adequate to handle contracts of any size, not only for starters but for complete electric lighting and ignition systems as well.

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While the complete Auto-Lite electric lighting system may be attached easily to the average car, it is more difficult to install a starting motor because space and structural limitations sometimes necessitate material alterations and considerable machine work before a satisfactory application can be made—hence orders from individual owners for *starting motors* are not solicited. You *can* have the complete Auto-Lite equipment on your *new* car however. Manufacturers can furnish it if you so specify.

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ADDRESS .....

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DYNAMOS (Continued)

ELECTRIC LIGHTING AND BATTERY CHARGING DYNAMOS (Continued)

DELCO—See Dayton Engineering Laboratories Co.

DETROIT Electric Appliance Co., 264-68 Jefferson Ave., Detroit, Mich. "Deaco."

DYNALUX—See Dean Electric Co.

DYNETO Electric Co., Syracuse, N. Y. (See page 391.)

ECK Dynamo & Motor Co., Belleville, N. J. (See page 409.)

ECONOMY Electric Co., Economy, Pa. "Perfection."

ELECTRIC Auto-Lite Co., 108 Michigan St., Toledo, O. "Auto-Liter." (See page 171.)

ELECTRIC Generator & Accumulator Co. of America, 140 S. Dearborn St., Chicago, Ill. "Elegenac."

ELGENAC—See Electric Generator & Accumulator Co. of America.

EMERSON Electric Mfg. Co., 2024-32 Washington Ave., St. Louis, Mo.

ESTERLINE Co., 228 E. South St., Indianapolis, Ind.

FISHER Electrical Works, 2000 Larned St. W., Detroit, Mich. (See page 409.)

GARWOOD Electric Co., Garwood, N. J.

GEISZLER Bros. Storage Battery Co., 1512-20 W. 57th St., New York, N. Y. (See page 525.)

GRAY & Davis, Boston, Mass. (See page 407.)

HARTMAN Electrical Mfg. Co., Mansfield, O.

HOLTZER-CABOT Electric Co., Brookline, Mass. (See page 231.)

KEMCO Electric & Mfg. Co., Cleveland, O.

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

LEONARD Electric Co., Ward, Bronxville, N. Y.

MAGLITE—See Briggs Magneto Co.

NATIONAL Coil Co., Lansing, Mich.

NORTH East Electric Co., Rochester, N. Y. (See page 601.)

OTHO Motor Co., 60 State St., Boston, Mass.

PERFECTION—See Economy Electric Co.

REMY Electric Co., Anderson, Ind. (See page 497.)

RUSHMORE Dynamo Works, Plainfield, N. J. (See page 245.)

SPLITDORF Electrical Co., 98 Warren St., Newark, N. J. "Splitdorflite."

SPLITDORFLITE—See Splitdorf Electric Co.

VERLUX Co., Alliance, O.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WELLS Mfg. Co., R. C., Station A. Fond du Lac, Wis. (See page 409.)

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

IGNITION DYNAMOS

(See Magnetos, Ignition)

ECONOMIZERS

FUEL ECONOMIZERS

(See Mixers or Agitators, Fuel)

EJECTORS

STEAM EJECTORS

(For filling tanks on steam cars)

PENBERTHY Injector Co., Detroit, Mich.

ELBOWS

PIPE ELBOWS

(See Fittings, Pipe)

ELECTROLYTE

STORAGE BATTERY ELECTROLYTE

CONTACT Process Co., Abbott Rd., Buffalo, N. Y.

GRASSELLI Chemical Co., 80 Maiden Lane, New York, N. Y.

KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y. (See page 595.)

ENAMELS

AUTOMOBILE ENAMELS

(See Paints, Enamel)

BRASS ENAMELS, LACQUERS AND FINISHES

(For blackening lamps, radiators and other brass work on car—See also Paints, Enamel; also Lacquers, Metal)

ARGENAMEL Chemical Co., Smead & Bancroft Sts., Toledo, O.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Silkup." (See page 167.)

ARSENAL Varnish Co., Rock Island, Ill.

BRADLEY & Vrooman Co., Chicago, Ill. "C. Q. P."

BRASS-KOTE—See Northwestern Chemical Co.

C. Q. P.—See Bradley & Vrooman Co.

COLUMBUS Varnish Co., Columbus, O. "Peerless."

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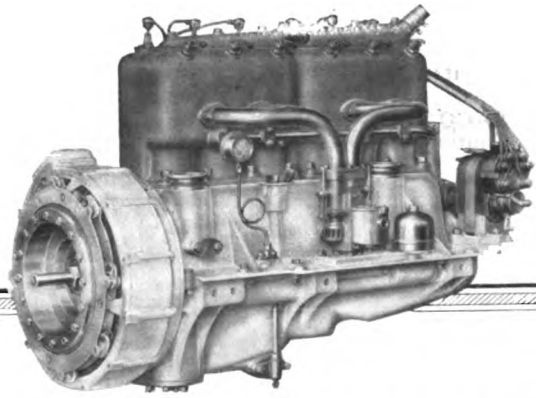

The U-S-L Electric Starter and Lighter abounds in hard-hitting talking points that directly influence the sales of U-S-L equipped cars.

Consider First the Simplicity

No noisy, power-consuming gears, chains or sprockets. The U-S-L Rotator—the sole moving part—bolted to the crank-shaft in place of the cast-iron fly-wheel applies its great starting power direct. No speed governors, clutches or bearings to oil.

Then the High Starting Speed

Instantly, without noise, jerk or jar, the U-S-L whirls the engine 200 to 400 R. P. M. No other starter spins the engine as fast.

Inherent Regulation—Another Exclusive U-S-L Feature

No external regulating devices are used. No energy wasted—automatic—no adjustments to make—battery charging commences at exceptionally low speed.

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Electric STARTER and Lighter

Standard Equipment on

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Sheffield-Simplex (England) Rochester Motor Rayfield
Fire Pump

The **U. S.** Light & Heating Co.

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ENAMELS (Continued)

BRASS ENAMELS, LACQUERS AND FINISHES (Continued)

DURKEE - ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

GUN Metal Finish Co., Main & Water Sts., Decatur, Ill.

HALL-THOMPSON Co., Hartford, Conn. "Jet-Lac."

JET-LAC—See Hall-Thompson Co.

LEATH-R-NU—See Nu-Back Mfg. Co.

NATIONAL Cement & Rubber Co., 341 S. St. Clair St., Toledo, O.

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

NORTHWESTERN Chemical Co., Marietta, O. "Brass-Kote."
(See pages 143 and 551.)

NU-BACK Mfg. Co., St. Louis, Mo. "Leath-R-Nu."

PEERLESS—See Columbus Varnish Co.

RIE-NIE—See Durkee-Atwood Co.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y.

SCHMOEGER, Frederic A., Sterling, Ill. "Stay-Shiny."

SLIKUP—See Arnold, N. B.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "3 Star."

STAY-BRIGHT Lacquer Co., 58 W. Washington St., Chicago, Ill.

STAY-SHINY—See Schmoeger, Frederic A.

3-STAR—See Sonneborn Sons.

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass.

ENGINES

GASOLINE ENGINES

(See Motors, Gasoline)

KEROSENE ENGINES

(See Motors, Kerosene)

STEAM AUTOMOBILE ENGINES

DIETER Steam Engine Co., 123 Liberty St., New York, N. Y.

OFELDT & Sons, F. W., Nyack, N. Y.

EYES

SCREW EYES

(See Screw Eyes)

FANS

RADIATOR FANS

(See also Radiators)

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

BRISCOE Mfg. Co., Detroit, Mich.

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CANDLER Radiator Co., 1086-90 Jefferson Ave., E., Detroit, Mich.
(See page 567.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 91.)

HARDY Mfg. Co., Pendleton, Ind.
(See page 177.)

HOTZ Foundry & Mfg. Co., Fremont, O.
(See page 547.)

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

McCORD Mfg. Co., Detroit, Mich.
(See pages 334 and 335.)

O-C—See Oakes Co.

OAKES Co., Indianapolis, Ind. "O-C."
(See page 177.)

SPARKS - WITHINGTON Co., Jackson, Mich.
(See page 175.)

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

FASTENERS

CURTAIN FASTENERS

ANDERSON Electric Machine Tool Co., 1113 Cass Ave., St. Louis, Mo.

AUBURN Machine Works, 290 Auburn Ave., Buffalo, N. Y. "Challenge."

BREWSTER—See Cowles & Co.

BROGA Automatic Fastener Co., Syracuse, N. Y.

CARR Fastener Co., 47 Ames St., Cambridge, Mass.

CHALLENGE—See Auburn Machine Works.

COWLES & Co., C., New Haven, Conn. "Brewster," "Excelsior," "Ideal," "Perfect," "Success."
(See page 177.)

CRANDAL, Stone & Co., Binghamton, N. Y. "Pioneer," "Premier."
(See page 379.)

DESOCO—See Detroit Socket Co.

DETROIT Auto Top Fastener Co., Beaubien & Fort Sts., Detroit, Mich. "Turtle."

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

EXCELSIOR—See Cowles & Co.

HIGGIN Mfg. Co., Newport, Ky.

IDEAL—See Cowles & Co.

JONAH & George, Merrimac, Mass.

LEADER—See Neider Co.

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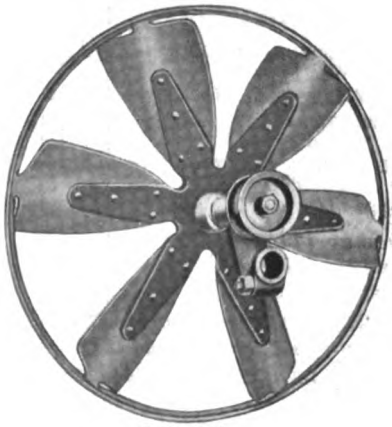
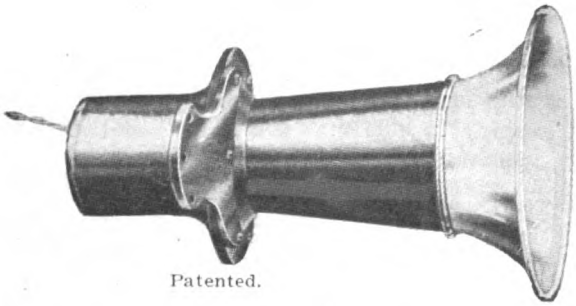
Is now standard equipment on 85% of the automobiles built in the United States.



Patented.

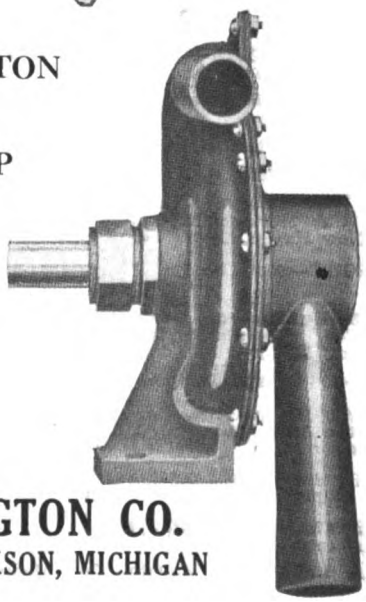
THE SPARTON MOTOR DRIVEN WARNING SIGNAL



Patented.

Nothing better in material, workmanship, or efficiency and on account of complete manufacturing facilities the price is most attractive.

THE SPARKS-WITHINGTON PRESSED METAL CENTRIFUGAL PUMP



The very trim and neat appearance of this pump quickly wins favor.

A saving of 40% in weight, with added strength at an advantage in price.

THE SPARKS-WITHINGTON CO.
WALKERVILLE, CANADA JACKSON, MICHIGAN

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FASTENERS (Continued)

CURTAIN FASTENERS (Continued)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass.

NEIDER Co., F. A., Augusta, Ky. "Peerless," "Leader."

NOVELTY Mfg. Co., Waterbury, Conn. (See page 495.)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

PEERLESS—See Neider Co.

PERFECT—See Cowles & Co.

PIONEER—See Crandal, Stone & Co.

PREMIER—See Crandal, Stone & Co.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

STRONG Co., M. H., 168 South Ave., Rochester, N. Y.

SUCCESS—See Cowles & Co.

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

TURTLE—See Detroit Auto Top Fastener Co.

UNITED States Fastener Co., 95 Milk St., Boston, Mass. (See page 177.)

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HOOD FASTENERS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 333.)

BUSH Mfg. Co., Hartford, Conn. (See page 225.)

DAYTON Malleable Iron Co., Dayton, O.

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

EVERTIGHT—See Garage Equipment Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco," "Evertight." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O. (See page 153.)

MEDINA Stamping & Machine Co., Medina, N. Y.

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

FENDERS

AUTOMOBILE FENDERS

STANDARD Fender Co., 111 W. Monroe St., Chicago, Ill.

MUD FENDERS

(See Guards, Mud)

FIBRE

HARD FIBRE

(Sheet, Rod and Tube)

AMERICAN Vulcanized Fibre Co., Wilmington, Del. (See page 179.)

BRANDYWINE Fibre Products Co., 815 Shipley St., Wilmington, Del.

CONCRETE Fibre Co., Ford & Lafayette Sts., Norristown, Pa.

CONTINENTAL Fibre Co., Newark, Del. (See page 143.)

DELAWARE Hard Fibre Co., Wilmington, Del.

DIAMOND State Fibre Co., Elsmere, Del.

EASTERN Hard Fibre Co., 50 Church St., New York, N. Y. (See page 179.)

EMPIRE Mfg. Co., 26th & Tatnall Sts., Wilmington, Del.

NATIONAL Fibre & Insulation Co., Yorklyn, Del.

SPAULDING & Sons Co., J., Wheeler St., Tonawanda, N. Y.

STANDARD Fibre Co., Miller St., Somerville, Mass.

WILMINGTON Fibre Specialty Co., Wilmington, Del. (See page 179.)

FILLERS

PAINT FILLERS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

BERRY Bros., Detroit, Mich. "Lionoil."

BRADLEY & Vrooman Co., Chicago, Ill. "C. Q. P."

BRIDGEPORT Wood Finishing Co., New Milford, Conn. "Wheelers."

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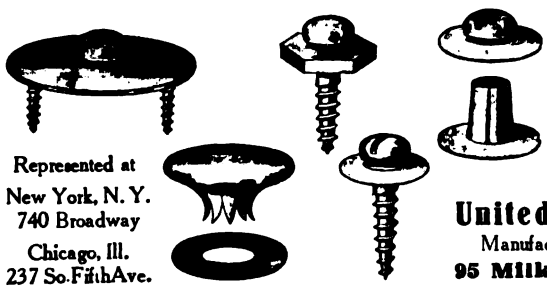

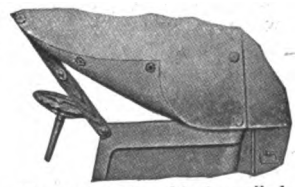

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FILLERS (Continued)

PAINT FILLERS (Continued)

C. Q. P.—See Bradley & Vrooman Co.

CAPITOL CITY—See Indianapolis Paint & Color Co.

CELOX—See Valentine & Co.

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y.

CHICAGO Varnish Co., 2100 Elston Ave., Chicago, Ill. "Chi-Var-Co."

CHI-VAR-CO.—See Chicago Varnish Co.

CINCINNATI Color Co., Eighth & Evans Sts., Cincinnati, O.

DITZLER Color Co., 16 W. Baltimore Ave., Detroit, Mich.

FLINT Varnish Works, Flint, Mich.

FLOOD & Conklin Co., 136 Chestnut St., Newark, N. J.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

HARDY Paint & Varnish Co., Toledo, O. (See page 297.)

HEATH & Milligan Mfg. Co., 1825-71 Seward St., Chicago, Ill.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Capitol City."

JOHNSTON Paint Co., R. F., Cincinnati, O. "Krakno." (See page 167.)

KEYSTONE Paint & Filler Co., Muncy, Pa.

KRAKNO—See Johnston Paint Co.

LIONOIL—See Berry Bros.

MASURY & Son, John W., New York, N. Y.

MOLLER & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.

MOSER Co., Chas., Cincinnati, O.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NELSON Color Co., Amesbury, Mass.

NICE, Eugene E., 272 S. Second St., Philadelphia, Pa.

PHOENIX Paint & Varnish Co., 124 Market St., Philadelphia, Pa.

RENO Bros. Paint Co., Pulaski, Pa.

ST. LOUIS Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo.

SCHRACK & Co., 152 N. Fourth St., Philadelphia, Pa.

SMITH & Co., Edward, Sixth St. & West Ave., Long Island City, N. Y.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y. "Celox."

VESTAL Paint Co., Vestal, N. Y.

WHEELERS—See Bridgeport Wood Finishing Co.

WILHELM Co., A., Third & Bern Sts., Reading, Pa.

FINS

RADIATOR FINS

(See Discs, Radiator)

FITTINGS

CURTAIN OPENING FITTINGS

DAYTON Top Improvement Co., Steely Bldg., Dayton, O. "Simplicity."

ERVIEN, Horace, Ogontz, Pa.

KELLY & Towers, 1618 Walnut Ave., Cleveland, O. "Towers."

SIMPLICITY—See Dayton Top Improvement Co.

TOWERS—See Kelly & Towers.

PIPE FITTINGS

(For Tubing or Brazing Fittings—See Tubing Unions)

BARD Union Co., Norwich, Conn.

BARRETT Mfg. Co., James, 50 Pearl St., Boston, Mass.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 836 S. Michigan Ave., Chicago, Ill.

DALTON-INGERSOLL Mfg. Co., 171-75 High St., Boston, Mass.

GRIP Coupling Co., Ware, Mass.

HAMLIN & Emery Brass Co., 49 Island St., Boston, Mass.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

JARECKI Mfg. Co., Erie, Pa.

KELLY & Jones Co., Greensburg, Pa.

KINSEY & Mahler Co., 400 S. Adams St., Peoria, Ill.

LAVIGNE Mfg. Co., Detroit, Mich. (See page 441.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McDONALD Mfg. Co., A. Y., Dubuque, Ia.

McNAB & Harlin Mfg. Co., 56 John St., New York, N. Y.

McRAE & Roberts Co., 221-35 Campbell Ave., Detroit, Mich.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

PITTSBURG Valve & Fittings Co., Barberton, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

POWHATAN Brass & Iron Works, Charlestown, W. Va.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis. "Union Cinch."

RUNDLE-SPENCE Mfg. Co., 67 Second St., Milwaukee, Wis.

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Cleveland Pittsburgh

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FITTINGS (Continued)

PIPE FITTINGS (Continued)

SHERMAN Mfg. Co., H. B., 12 Barney St., Battle Creek, Mich.

STODDARD Union Co., 60 Arch St., Boston, Mass.

UNION CINCH—See Richardson-Phenix Co.

WALWORTH Mfg. Co., Boston, Mass. (See page 559.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

TOP FITTINGS AND FIXTURES

(See also Bows, Top; also Fasteners, Curtain; also Irons, Slat; also Irons, Top; also Rests, Bow; also Separators, Bow; also Sockets, Bow; also Straps, Top)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

BLAKESLEE Forging Co., Plantsville, Conn.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y.

CRANDAL, Stone & Co., Binghamton, N. Y. (See page 379.)

DAYTON Top Improvement Co., Steely Bldg., Dayton, O. "Single Man."

DOUGLAS & Lomason Co., Detroit, Mich.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. (See page 221.)

HIGGIN Mfg. Co., Newport, Ky.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MONARCH Carriage Goods Co., 2838-44 Spring Grove Ave., Cincinnati, O.

NEWTON & Son, W. H., 125 Elm St., Cortland, N. Y.

SCHERER & Co., H., Detroit, Mich.

SIMPLEX Specialties Co., 69 Buhl Blk., Detroit, Mich. (See page 341.)

SINGLE MAN—See Dayton Top Improvement Co.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

FLAGS

FLAGS, PENNANTS AND EMBLEMS

KOSMOS-ART Co., Cincinnati, O.

LUXEMOOR Co., 110 E. 13th St., New York, N. Y.

ORCUTT & Co., J. C., 134 S. 13th St., Lincoln, Neb.

SPIEGEL Art Co., 111 Broadway, Brooklyn, N. Y.

FLANGES

PRESSED STEEL HUB FLANGES

(For Forged or Cast Flanges—See Forgings; also Castings)

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y. (See page 233.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CROSBY Co., Buffalo, N. Y.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich. (See page 233.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 607.)

GIER & Dail Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KELSEY Wheel Co., Detroit, Mich.

KONIGSLOW Mfg. Co., Otto., Cleveland, O

SPARKS-WITHINGTON Co., Jackson, Mich. (See page 175.)

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 167.)

FLOATS

CORK CARBURETER FLOATS

ARMSTRONG Cork Co., 23d St. & Railroad Ave., Pittsburg, Pa.

MUNDET & Son, L., King, Ferris & Sullivan Sts., Brooklyn, N. Y.

PADDOCK Cork Co., 1209-17 DeKalb Ave., Brooklyn, N. Y.

METAL CARBURETER FLOATS

FITZGERALD Mfg. Co., Torrington, Conn. (See page 231.)

GOODNOW & Blake Mfg. Co., Fourth & Porter Sts., Detroit, Mich.

GOODWIN & Kintz Co., Winsted, Conn.

HERCULES Float Works, 200-10 Franklin St., Springfield, Mass.

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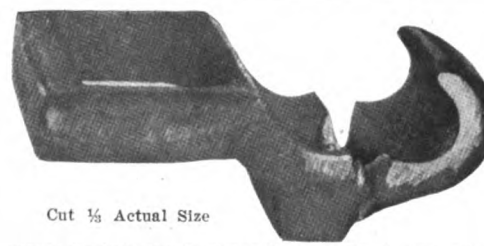

Cut ½ Actual Size
Chain Link, Tested at Columbia University
Yield Point, 9,100 lbs.
Maximum Load, 24,100 lbs.

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FLOATS (Continued)

METAL CARBURETER FLOATS (Continued)

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

NAUGATUCK Mfg. Co., Naugatuck, Conn.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 160.)

FORGINGS

DROP FORGINGS

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

ANDERSON Forge & Machine Co., Detroit, Mich.
(See page 183.)

ATLAS Drop Forge Co., Lansing, Mich.
(See page 187.)

ATWATER Mfg. Co., Southington, Conn.

BAKER Drop Forge Co., Jackson, Mich.
(See page 235.)

BALDWIN Steel Co., Charleston, W. Va.

BARNETT Drop Forging Co., East Hampton, Mass.
(See page 223.)

BATES Forge Co., 229 W. Merrill St., Indianapolis, Ind.

BELDEN Machine Co., Whalley Ave. & Tryon St., New Haven, Conn.

BETHLEHEM Steel Co., Third & Poplar Sts., South Bethlehem, Pa.

BILLINGS & Spencer Co., Hartford, Conn.

BLAKESLEE Forging Co., Plantsville, Conn.

BUFFALO Drop Forge Co., 55 Carroll St., Buffalo, N. Y.

CANTON Drop Forging & Mfg. Co., Canton, O.
(See page 187.)

CAPE Ann Tool Co., Granite St., Pigeon Cove, Mass.

CHAMPION Machine & Forging Co., 3725 E. 78th St., Cleveland, O.
(See page 671.)

CHICAGO Drop Forge & Foundry Co., 447-517 Kensington Ave., Chicago, Ill.

CHRISTIE-KLINE Forge Co., 60 St. Aubin Ave., Detroit, Mich.

CLAPP Mfg. Co., E. D., Auburn, N. Y.

CLEVELAND Hardware Co., Cleveland, O.

COLUMBIAN Hardware Co., 1296 E. 53d St., Cleveland, O.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

COLUMBUS Forge & Iron Co., Columbus, O.

CONSOLIDATED Mfg. Co., Toledo, O.
(See page 187.)

CORTLAND Forging Co., Cortland, N. Y.

CRESCENT Forgings Co., Oakmont, Pa.

DEAN Forging Co., 1825 E. Jackson St., Muncie, Ind.

DETROIT Forging Co., 120 Mt. Elliott St., Detroit, Mich.

DETROIT Steel Products Co., Boulevard & Griffin St., Detroit, Mich.
(See page 283.)

DIAMOND Forging & Mfg. Co., Pittsburg, Pa.

DODGE Bros., 1678-1724 Jos. Campau Ave., Detroit, Mich.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

DROP Forging Co. of New York, West Side Ave. & Fisk St., Jersey City, N. J.

ECCLES Co., Richard, Auburn, N. Y.
(See page 131.)

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.)

ELMORE Tool Mfg. Co., Hartford, Conn.

EMERGENCY Forge Co., Lansing, Mich.

EUREKA Co., North East, Pa.
(See page 273.)

FOREST City Electric Co., 5003 Windsor Ave., Cleveland, O.

FRUIN Drop Forge Co., 345 Root St., Chicago, Ill.

FULTON Machine & Forging Co., Canal Fulton, O.

GENERAL Drop Forge Co., 1740 Elmwood Ave., Buffalo, N. Y.
(See page 187.)

GLOBE Malleable Iron & Steel Co., Syracuse, N. Y.
(See page 123.)

HERBRAND Co., Fremont, O.

HIGGINS Spring & Axle Co., 1314 16th St., Racine, Wis.
(See page 375.)

HOUK Mfg. Co., Buffalo, N. Y.

INDIANAPOLIS Drop Forging Co., Madison Ave. & Dowling St., Indianapolis, Ind.

INGALLS-SHEPARD Forging Co., Michigan Ave. & Van Buren St., Chicago, Ill.
(See page 503.)

JACKSON Drop Forging Co., Jackson, Mich.

KILBORN & Bishop Co., Chapel & Lloyd Sts., New Haven, Conn.

KROPP Forge Co., 2508-22 W. 21st St., Chicago, Ill.

KRUPP—See Prosser & Son.

LAKESIDE Forge Co., Erie, Pa.

LEWIS Spring & Axle Co., Jackson, Mich.

MACHINERY Forging Co., Hamilton & Marquette Sts., Cleveland, O.

MARTIN Forging Co., H. J., 510 Harding St., Indianapolis, Ind.

MERRILL Bros., Maspeth, N. Y.

MICHIGAN Bolt & Nut Works, ft. Meldrum Ave., Detroit, Mich.

MOORE Drop Forging Co., Birnie Ave., Springfield, Mass.

NEW England Forge Co., 9 Plymouth St., Worcester, Mass.

O. K. Tool Holder Co., Shelton, Conn.

OBENBERGER Drop Forge Co., Cudahy, Wis.

OHIO Forge Co., 2186-2210 E. 65th St., Cleveland, O.
(See page 601.)

OLIVER Iron & Steel Co., Pittsburg, Pa.

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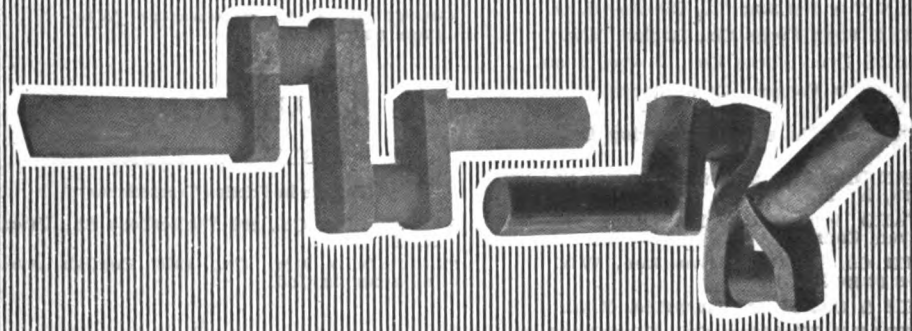
Drop Forgings



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FORGINGS (Continued)

DROP FORGINGS (Continued)

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

PARK Drop Forge Co., Cleveland, O. (See page 163.)

PORTLAND Foundry & Machine Co., Portland, Ind.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

QUEEN City Forging Co., Cincinnati, O.

RACINE Drop Forge Co., Racine, Wis.

REVERE Drop Forge Co., Revere, Mass.

RICHMOND Forging Corp. (Acca Station), Richmond, Va.

RIVETLESS Chain & Engineering Co., Avon, Pa.

ROREN Drop Forging Co., 37 Warren St., New York, N. Y.

SEWARD & Son Co., M., Grant St., New Haven, Conn.

SMITH Co., A. O., Milwaukee, Wis. (See page 387.)

SMITH & Co., H. D., Plantville, Conn.

STANDARD Welding Co., Cleveland, O. (See Book Mark.)

STRIEBY & Foote Co., 301 Ogden St., Newark, N. J.

SUNDBERG Co., Kinzie & Carpenter Sts., Chicago, Ill.

TRANSUE & Williams Co., W. Ely St., Alliance, O.

UNION Drop Forge Co., 358 W. Indiana St., Chicago, Ill.

UNION Forging Co., Union, N. Y. (See page 131.)

WAVERLY Co., 139 S. East St., Indianapolis, Ind.

WESTERN Drop Forge Co., Marion, Ind. (See page 411.)

WESTERN Malleable Steel Co., 1250 Jefferson Ave., W., Detroit, Mich.

WESTERN Tool & Forge Co., Brackenridge, Pa.

WHITMAN & Barnes Mfg. Co., Akron, O.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

WILCOX Mfg. Co., D., Mechanicsburg, Pa.

WILLIAMS & Co., J. H., 150 Hamilton Ave., Brooklyn, N. Y.

WRIGHT Wrench & Forging Co., 1424 Barth St., Canton, O.

WYMAN & Gordon Co., Worcester, Mass. (See page 161.)

FRAMES

PRESSED STEEL FRAMES

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich. "Presteel." (See page 233.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa. (See page 607.)

FORSYTH Bros. Co., Harvey, Ill.

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O. (See page 321.)

KINSEY Mfg. Co., Toledo, O. (See page 153.)

KRUPP—See Prosser & Son.

PARISH Mfg. Co., Reading, Pa. (See page 495.)

PARISH & Bingham Co., Cleveland, O. (See page 185.)

PRESTEEL—See Detroit Pressed Steel Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

SMITH Co., A. O., Milwaukee, Wis. (See page 387.)

FRICTIONS

FIBRE FRICTIONS

(For use in Friction Transmission)

DIVINE Bros. Co., 202 Whitesboro St., Utica, N. Y.

ROCKWOOD Mfg. Co., 1800 English Ave., Indianapolis, Ind.

GALVANIZING

GALVANIZING, SHERARDIZING AND RUST-PROOFING

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BONTEMPI Rust-Proofing Co., 949 Broadway, New York, N. Y.

BRIDGEPORT Electro Plate Co., 270 Kossuth St., Bridgeport, Conn.

BUFFALO Galvanizing & Tinning Works, 49-53 Jackson St., Buffalo, N. Y.

CLEVELAND Galvanizing Works Co., Cooper Ave. & P. R. R., Cleveland, O.

CRAMP & Sons Ship & Engine Bldg. Co., William, Philadelphia, Pa. (See page 269.)

DANA Mfg. Co., Cincinnati, O.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 467.)

GEUDER, Paeschke & Frey Co., 100 15th St., Milwaukee, Wis.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

GRABLER Mfg. Co., Cleveland, O.

MALLEABLE Iron Fittings Co., Branford, Conn. (See page 477.)

MEAKER Co., Fulton & Elizabeth Sts., Chicago, Ill.

METAL Treating & Equipment Co., 834 Humboldt St., Brooklyn, N. Y.

NATIONAL Galvanizing Co., 1918-26 Carroll Ave., Chicago, Ill.

NEW England Sherardizing Co., Hartford Conn.

NEW Haven Sherardizing Co., State & Lawrence Sts., New Haven, Conn.

NEWARK Stamping Co., Newark, O. (See page 423.)

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They mean much to you, Mr. Automobile Builder.

The Parish & Bingham Co.

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Cleveland, Ohio

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GALVANIZING (Continued)

GALVANIZING, SHERARDIZING AND RUST-PROOFING (Continued)

OHIO Sherardizing Co., Whitney Power Blk., Cleveland, O.

R. I. Welding & Sherardizing Co., Promenade & Park Sts., Providence, R. I.

SHERARDIZING Co. of Illinois, 567 W. Van Buren St., Chicago, Ill.

STANLEY Works, New Britain, Conn.

TOWER Mfg. Co., Madison, Ind.

UNION Elevator & Machine Co., 215-17 W Ontario St., Chicago, Ill.

U. S. Electro-Galvanizing Co., 1-9 Park Ave., Brooklyn, N. Y.

VAIL Galvanizing Plant, 209-11 Commercial St., Boston, Mass.

GAPS

SPARK GAPS

ACME—See Sheer Co.

BREMER & Mooney Mfg. Co., 538 Muskego St., Milwaukee, Wis.

CHAMPION Spark Plug Co., 134 Upton Ave., Toledo, O. "Misskip." (See page 311.)

CUT-OUT Switch Co., Broadway & 195th St., New York, N. Y.

DALITZ Mfg. Co., 3134 Payne Ave., Cleveland, O.

HEMMETER Spark Gap Mfg. Co. Dime Bank Bldg., Detroit, Mich.

HERZ & Co., New York, N. Y. "Oscillum." (See page 309.)

IDEAL—See Mapes, Lee C.

MANVILLE, Geo. W., Bridge St., Towanda, Pa.

MAPES, Lee C., 16 Fulton Ave., Rochester, N. Y. "Ideal."

MEANS, Eugene D., Towanda, Pa.

MISSKIP—See Champion Spark Plug Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y. (See page 309.)

OSCILLUM—See Herz & Co.

SHEER Co., H. M., Quincy, Ill. "Acme."

SMITH & Gunn, 22-26 E. Broad St., Burlington, N. J.

T. A. D.—See Toledo Auto Devices Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

GARAGES

PORTABLE GARAGE BUILDINGS

ALADDIN—See North American Construction Co.

AMERICAN Portable House Co., Arcade Bldg., Seattle, Wash.

ANCHOR Corrugating Construction Co., 62 Cortlandt St., New York, N. Y.

BURNHAM-STANDEFORD Co., Washington & First Sts., Oakland, Cal.

CATHERMAN, J. A., Beaver Springs, Pa.

CHESBRO-WHITMAN Co., 1167 First Ave., New York, N. Y.

CORNELL—See Wyckoff Lumber & Mfg. Co.

CRAIG, David, 70 Broad St. Boston, Mass.

DUCKER Co., 277 Broadway, New York, N. Y.

DULUTH Corrugating & Roofing Co., Duluth, Minn.

EDWARDS Mfg. Co., 724-74 Eggleston Ave., Cincinnati, O. "Steelcote."

FARGO Cornice & Ornament Co., 1002-04 Front St. Fargo, N. Dak. "Rusk."

GORDON Mfg. Co., Middletown, O.

HARRY Steel Co., O. K., 2333-35 Papin St., St. Louis, Mo.

HODGSON Co., E. F., 116 Washington St., Boston, Mass.

IDEAL Sectional Building Co., St. Johns, Mich.

ILLINOIS Portable House Co., 6331-33 Evanston Ave., Chicago, Ill.

KARR Portable House Co., 2554 W. Irving Park Blvd., Chicago, Ill.

KENYON Co., R. L., Waukesha, Wis.

MERSHON & Morley Co., Saginaw, Mich.

METAL Shelter Co., 3-23 W. Water St., St. Paul, Minn. "Pruden."

NILES Iron & Steel Roofing Co., Niles, O.

NORTH American Construction Co., Bay City, Mich. "Aladdin."

PINYOUN & Son, F. C., 2526 Carnegie Ave., Cleveland, O.

PRUDEN—See Metal Shelter Co.

PRUDEN Co., C. D., Warner, Dock & Bayard Sts., Baltimore, Md.

RIVERSIDE Mfg. Co., 162-66 Riverside Ave., Newark, N. J.

ROGERS Co., J. S., Moorestown, N. J.

RUBY Mfg. Co., Jackson & Douglass Sts., Jackson, Mich.

RUSK—See Fargo Cornice & Ornament Co.

SPRINGFIELD Mfg. Co., Chicopee Rd., Springfield, Mass.

STEEL Portable Building Co., Chicago, Ill.

STEELCOTE—See Edwards Mfg. Co.

TAYLOR Mfg. Co., 219 Glenridge Ave., Montclair, N. J.

WYCKOFF Lumber & Mfg. Co., Ithaca, N. Y. "Cornell."

GASKETS

METALLIC GASKETS

(For Asbestos, Composition or Rubber Gaskets—See Packing)

AKRON Metallic Gasket Co., 274 Park St., Akron, O.

BETTCHER Mfg. Co., Cleveland, O.

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

FITZGERALD Mfg. Co., Torrington, Conn. (See page 231.)

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Special Drop Forgings in Quantities
Chrome Nickel and all Special Steels

OIL TREATING AND ANNEALING

THE CANTON DROP FORGING AND MANUFACTURING CO.
CANTON, OHIO, U. S. A.

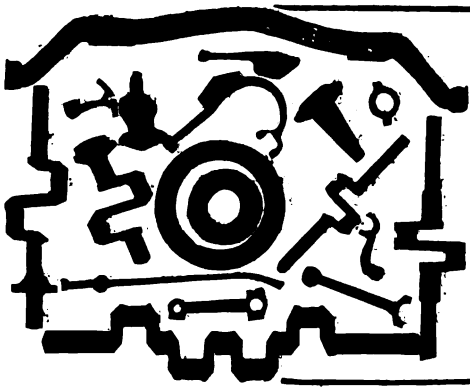
We are PIONEERS in making and heat-treating

DROP HAMMER FORGINGS

from SPECIAL ANALYSIS STEEL. Making parts for PEERLESS, WINTON, GARFORD, REO, and others.

LET US FIGURE ON YOUR PRINTS
SATISFACTORY SERVICE GUARANTEED

THE CONSOLIDATED MFG. CO., Toledo, Ohio



Atlas Forgings

ARE KNOWN THE COUNTRY OVER

AXLES, CRANKS, GEARS
Any Style, Any Design

THESE ARE A FEW SAMPLES

ATLAS DROP FORGE CO., Lansing, MICH.
"The Crank Makers of America"

GENERAL DROP FORGE COMPANY
DROP FORGINGS
1740 ELMWOOD AVE., BUFFALO, N.Y.

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GASKETS (Continued)

METALLIC GASKETS (Continued)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa. "Right."

GASTITE—See Goodwin & Kintz Co.

GOODWIN & Kintz Co., Winsted, Conn. "Gastite."

HERZ & Co., New York, N. Y. (Importers.) (See page 599.)

KINSEY Mfg. Co., Toledo, O. "Kinwood." (See page 153.)

KINWOOD—See Kinsey Mfg. Co.

McCORD Mfg. Co., Detroit, Mich. "McKim." (See pages 334 and 335.)

McKIM—See McCord Mfg. Co.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

PHOENIX Specialty Mfg. Co., 48-50 Duane St., New York, N. Y.

RIGHT—See Gasket Supply Co.

UNITED States Indestructible Gasket Co., 50 Church St., New York, N. Y.

VICTOR Mfg. & Gasket Co., Troy & 21st Sts., Chicago, Ill.

GASOLINE

AUTOMOBILE GASOLINE

BUCK & Co., E. A., Worcester, Mass. "Powers."

CREW Levick Co., Land Title Bldg., Philadelphia, Pa. (See page 149.)

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

GULF Refining Co., Frick Bldg. Annex, Pittsburg, Pa.

NATIONAL Refining Co., Rose Bldg., Cleveland, O. "White Rose."

PETROLEUM Products Co., 3600-10 Grant Blvd., Pittsburg, Pa. "Vigorite."

POWERS—See Buck & Co.

PURE Oil Co., Fifth & Chestnut Sts., Philadelphia, Pa.

STANDARD Oil Co. of N. Y., New York, N. Y.

TEXACO—See Texas Co.

TEXAS Co., New York, N. Y. "Texaco."

TIONA Refining Co., Indianapolis, Ind.

ULLER, C. C., Tidioute, Pa.

VIGORITE—See Petroleum Products Co.

WAVERLY Oil Works Co., 54th St. & A. V. R. R., Pittsburg, Pa.

WHITE ROSE—See National Refining Co.

GATES

AUTOMATIC DRIVEWAY GATES

BYERLY—See Cargill Mfg. Co.

CARGILL Mfg. Co., West End of Buttles Ave., Columbus, O. "Byerly."

MANLOVE Gate Co., 17 W. Huron St., Chicago, Ill.

GAUGES

BATTERY GAUGES

(Pocket Battery Testers. For Standard Instruments—See Ammeters)

ADVANCE—See Eldredge Electric Mfg. Co.

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

ATWATER Kent Mfg. Works, 4937 Stenton Ave., Philadelphia, Pa.

CLARK Electric Meter Co., 219 S. Clinton St., Chicago, Ill.

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See page 497.)

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

ELCO—See Eldredge Electric Mfg. Co.

ELDREDGE Electric Mfg. Co., 7 Post Office Sq., Springfield, Mass. "Advance," "Elco."

EVER READY—See American Ever Ready Co.

EXCEL Instrument Co., 1555 E. 65th St., Cleveland, O.

HANDY—See Roller-Smith Co.

HOYT Electrical Instrument Works, Penacook, N. H. "Triune," "Utimate." (See page 565.)

PENNSYLVANIA Rubber & Supply Co., 1845-47 Euclid Ave., Cleveland, O. "Prsco."

PIGNOLET, Louis M., 78 Cortlandt St., New York, N. Y.

PRSCO—See Pennsylvania Rubber & Supply Co.

READRITE Meter Works, 22 Main St., Bluffton, O.

RELIANCE Instrument Co., 1135 Van Buren St., Chicago, Ill.

ROBERT Instrument Co., 56 Shelby St., Detroit, Mich.

ROLLER-SMITH Co., 203-05 Broadway, New York, N. Y. "Handy."

STACKPOLE Carbon Co., St. Marys, Pa. (See page 607.)

STERLING Mfg. Co., 321 Frankfort Ave., Cleveland, O.

TRIUNE—See Hoyt Electrical Instrument Works.

TROY Electrical Co., River & State Sts., Troy, N. Y.

ULTIMATE—See Hoyt Electrical Instrument Works.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

BOILER WATER-LINE GAUGES

(For indicating height of water in steam boilers)

ASHTON Valve Co., 271 Franklin St., Boston, Mass. (See page 239.)

JERGUSON Mfg. Co., 10 Post Office Sq., Boston, Mass.

RELIABLE Water Gauge Co., 1616 Pine St., St. Louis, Mo.

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

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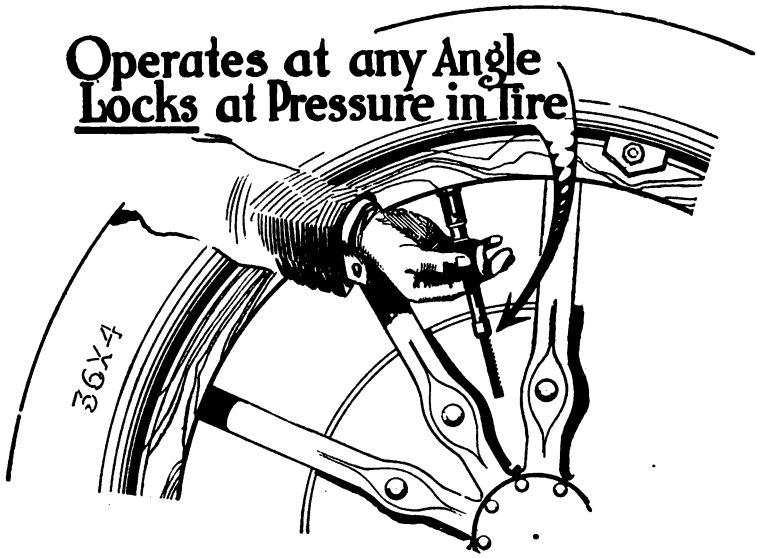
The New Positive Lock Stop
Twitchell Air Gauge

will continue to be the

Standard Tire Pressure Gauge in 1914



Tire Insurance for $1.00

THE *new* Twitchell is accurate, simple, durable, easily applied and easily read. It can be used with the tire valve at any angle and positively locks at pressure in tire. Insist upon getting the NEW Twitchell. It possesses a positive lock stop feature that renders absolutely impossible the registration of any but the exact air pressure in your tires. This construction permits the use of the gauge, no matter in what position the tire valve rests. You no longer have to turn the wheel around until the valve is at the bottom. Another improvement to be found in the NEW Twitchell is the lengthened base, which permits of an airtight connection being made with the valve, no matter how small the space between the rim and hub.

The demand for Twitchells this year was in excess of our ability to satisfy it. Next year it promises to be even greater. Be ready to meet it.

The Twitchell Gauge Company

1208 Michigan Avenue Chicago, Illinois

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GAUGES (Continued)

CYLINDER COMPRESSION GAUGES

(For testing compression in gas engine cylinders)

AZADIAN Gauge Mfg. Co., Syracuse, N. Y.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

UNITED States Gauge Co., New York, N. Y. (See page 193.)

GASOLINE TANK GAUGES

(For indicating amount of gasoline in fuel tanks)

BOSTON Auto Gage Co., 8 Waltham St., Boston, Mass "Triumph." (See page 191.)

BUSH Mfg. Co., Hartford, Conn. (See page 225.)

BUNDY-GOEBEL Mfg. Co., Detroit, Mich.

CARR Signal Gauge Co., Lansing, Mich.

DEPENDO—See Roper & Co.

E-Z-2-C—See National Motor Supply Co.

EUREKA Gauge Co., Majestic Bldg., Detroit, Mich.

FREER—See Tanner-Hower Mfg. Co.

GOODNOW Mfg. Co., Old South Bldg., Boston, Mass.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANS Motor Equipment Co., La Crosse, Wis.

HYDRO-CATOR—See Sterling Gauge Co.

IMPERIAL Fluid Gauge Co., Canton, O.

JOHNSTON, J. E., Ardmore, Pa.

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

KANT-STIK—See National Motor Supply Co.

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

MODERN Specialty Co., Racine, Wis.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O. "Kant-Stik," "E-Z-2-C."

PFAHL Gauge & Mfg. Co., Akron, O.

RACINE Gauge Co., 1220 13th St., Racine, Wis.

RANDALL-FAICHNEY Co., Boston, Mass. "Webster." (See page 229.)

RITZ—See Ritz-Woller, Oliver C.

RITZ-WOLLER, Oliver C., 536-38 S. Clark St., Chicago, Ill. "Ritz."

ROPER & Co., C. F., Hopedale, Mass. "Dependo." (See page 319.)

RUDELL Gasoline Indicator Co., 1716 Crenshaw Blvd., Los Angeles, Cal.

STERLING Gauge Co., 132 Larned St., E., Detroit, Mich. "Hydro-Cator."

TANNER—See Tanner-Hower Mfg. Co.

TANNER-HOWER Mfg. Co., Akron, O. "Freer," "Tanner." (See page 543.)

TRIUMPH—See Boston Auto Gage Co.

WEBSTER—See Randall-Faichney Co.

STEAM AND AIR GAUGES

(Standard Pressure Gauges)

AMERICAN Steam Gauge & Valve Mfg. Co., 203 Camden St., Boston, Mass.

ASHTON Valve Co., 271 Franklin St., Boston, Mass. (See page 239.)

AZADIAN Gauge Mfg. Co., Syracuse, N. Y.

BELFIELD Co., H., 435 N. Broad St., Philadelphia, Pa.

CLEVELAND Steam Gauge Co., 418 W. Prospect Ave., Cleveland, O.

IMPROVED Gage Mfg. Co., 302 W. Water St., Syracuse, N. Y.

MARSH & Co., Jas. P., 321-23 W. Washington St., Chicago, Ill.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

UNITED States Gauge Co., New York, N. Y. (See page 193.)

UTICA Steam Gauge Co., Frankfort, N. Y.

TIRE PRESSURE GAUGES

(For indicating pressure in tires—See also Valves Tire Safety)

ADVANCE Specialty Co., Shinola Bldg., Rochester, N. Y. "Staon."

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y. "Tyrometer." (See page 107.)

AZADIAN Gauge Mfg. Co., Syracuse, N. Y.

BARNARD Specialty Co., 3300 Maple Ave., Los Angeles, Cal.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. "Vance," "Desmond."

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

DESMOND—See Chicago-Racine Aluminum, Brass & Iron Works.

ECONOMY—See Edelmann & Co.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill. "Economy."

HANS Motor Equipment Co., La Crosse, Wis.

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill. "Pneu-Meter."

HONEST—See National Motor Supply Co.

IMPROVED Gage Mfg. Co., 302 W. Water St., Syracuse, N. Y.

INVINCIBLE—See United States Gauge Co.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Washburn." (See pages 215 and 527.)

KELLOGG Mfg. Co., 3 Circle St., Rochester, N. Y. (See page 331.)

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O. "Honest."

PNEU-METER—See Hill Pump Valve Co.

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y. (See page 443.)

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Seven Good Reasons WHY "Triumph"

"TRIUMPH"
Upright Model No. 26
Head removed to show magnet and tube cut to show float.

Magnetic Gasoline Tank Gages Are Used by Car Manufacturers Who Want THE BEST

FIRST. Our Guarantee.
SECOND. Pressure leakage impossible even if the glass is broken because there is no hole through the gage head.
THIRD. Best Possible Material and Workmanship.
FOURTH. Our spirally slotted tube insures accuracy.
FIFTH. Dials graduated in gallons, quarts, tenths, or in any way you may wish.
SIXTH. All parts interchangeable.
SEVENTH. Small and Ornamental.

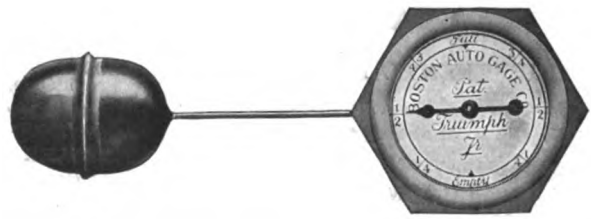
SO SIMPLE AND PERFECT THAT IMPROVEMENT IS IMPOSSIBLE.

Part of 1914 Standard Equipment on such cars as:
PIERCE-ARROW
PACKARD
LANCIA
STEVENS-DURYEA
LOCOMOBILE
MERCER
CADILLAC
COLE
MARMON
SIMPLEX
MOON
STANLEY STEAMER
and others.

Send us a blue print of your tank, and let us quote you for your season's requirements.

Get in touch with us any way. Our proposition merits it.

DO IT NOW!



"TRIUMPH" Junior Magnetic Gasoline Tank Gage

The **only** gage which can be applied either to the side or end of a rectangular or cylindrical tank.

Catalog with plate showing installation of gages upon request.

BOSTON AUTO GAGE COMPANY

8 Waltham Street **BOSTON, MASS.**

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GAUGES (Continued)

TIRE PRESSURE GAUGES (Continued)

STANDARD Gauge Mfg. Co., Foxboro, Mass

STAON—See Advance Specialty Co.

STEVENS & Co., 375 Broadway, New York, N Y.
(See page 473.)

STEVENS Mfg. & Supply Co., 1223-27 Wabash Ave., Chicago, Ill.

TWITCHELL Gauge Co., 1208 Michigan Ave., Chicago, Ill.
(See page 189.)

TYROMETER—See Allen Auto Specialty Co.

UNITED States Gauge Co., New York, N. Y. "Invincible."
(See page 193.)

VANCE — See Chicago - Racine Aluminum, Brass & Iron Works.

WASHBURN—See Judd & Leland Mfg. Co.

WATER CIRCULATION GAUGES

(For indicating pressure in water cooling systems)

AZADIAN Gauge Mfg. Co., Syracuse, N. Y.

IMPROVED Gage Mfg. Co., 802 W. Water St., Syracuse, N. Y.

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

STANDARD Gauge Mfg. Co., Foxboro, Mass.

GAUNTLETS

MOTORISTS GAUNTLETS

(See Gloves, Motorists)

GEARS

DIFFERENTIAL GEARS

BARNES Gear Co., Oswego, N. Y.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 211.)

BROWN-LIPE-CHAPIN Gear Co., Syracuse, N. Y.
(See page 601.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 553.)

CULLMAN Wheel Co., 1352 Greenwood
(See page 263.)

FROST Gear & Machine Co., Jackson, Mich.
(See page 235.)

GEARLESS Differential Co., 702 Penobscot Bldg., Detroit, Mich.
(See page 447.)

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O.
(See page 211.)

M. & S. Gear Co., 1528 Grand Ave., Kansas City, Mo.
(See page 509.)

METAL Products Co., Detroit, Mich.
(See page 537.)

MUNCIE Gear Works, Muncie, Ind.

NEW Process Gear Corp., Syracuse, N. Y.
(See page 201.)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 195.)

RUSSEL Motor Axle Co., Detroit, Mich.
(See page 155.)

RUSSEL Wheel & Foundry Co., Detroit, Mich.

WARNER Gear Co., Muncie, Ind.
(See page 253.)

WARNER Mfg. Co., Toledo, O.
(See page 481.)

WAYNE Auto Axle Co., Fort Wayne, Ind.
(See page 517.)

RUNNING GEARS

BORBEIN Auto Co., 2109-11 N. Ninth St., St. Louis, Mo.

DART Motor Mfg. Co., Waterloo, Ia.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

CYCLECAR STEERING GEARS

BENHAM Mfg. Co., 1882 Mt. Elliott Ave., Detroit, Mich.

STEERING GEARS

ADVANCE Gear Co., Detroit, Mich.

ADVANCE Power Co., 517 Aldine Pl., Chicago, Ill.

BARNES Gear Co., Oswego, N. Y.

BAYARD & Co., M. L., Woodbine, N. J. "Hindley."

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 211.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 553.)

DITWILER Mfg. Co., Galion, O.

FOSTER Gear Co., Columbus, O.

GEMMER Mfg. Co., Detroit, Mich.
(See page 571.)

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O.
(See page 211.)

HINDLEY—See Bayard & Co.

JACKSON-CHURCH-WILCOX Co., Saginaw, W. S., Mich. "Jacox."
(See page 197.)

JACOX—See Jackson-Church-Wilcox Co.

LAVIGNE Gear Co., Station A., Racine, Wis.
(See page 511.)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 195.)

S. & W.—See Schweppe & Wilt Mfg. Co.

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich. "S. & W."

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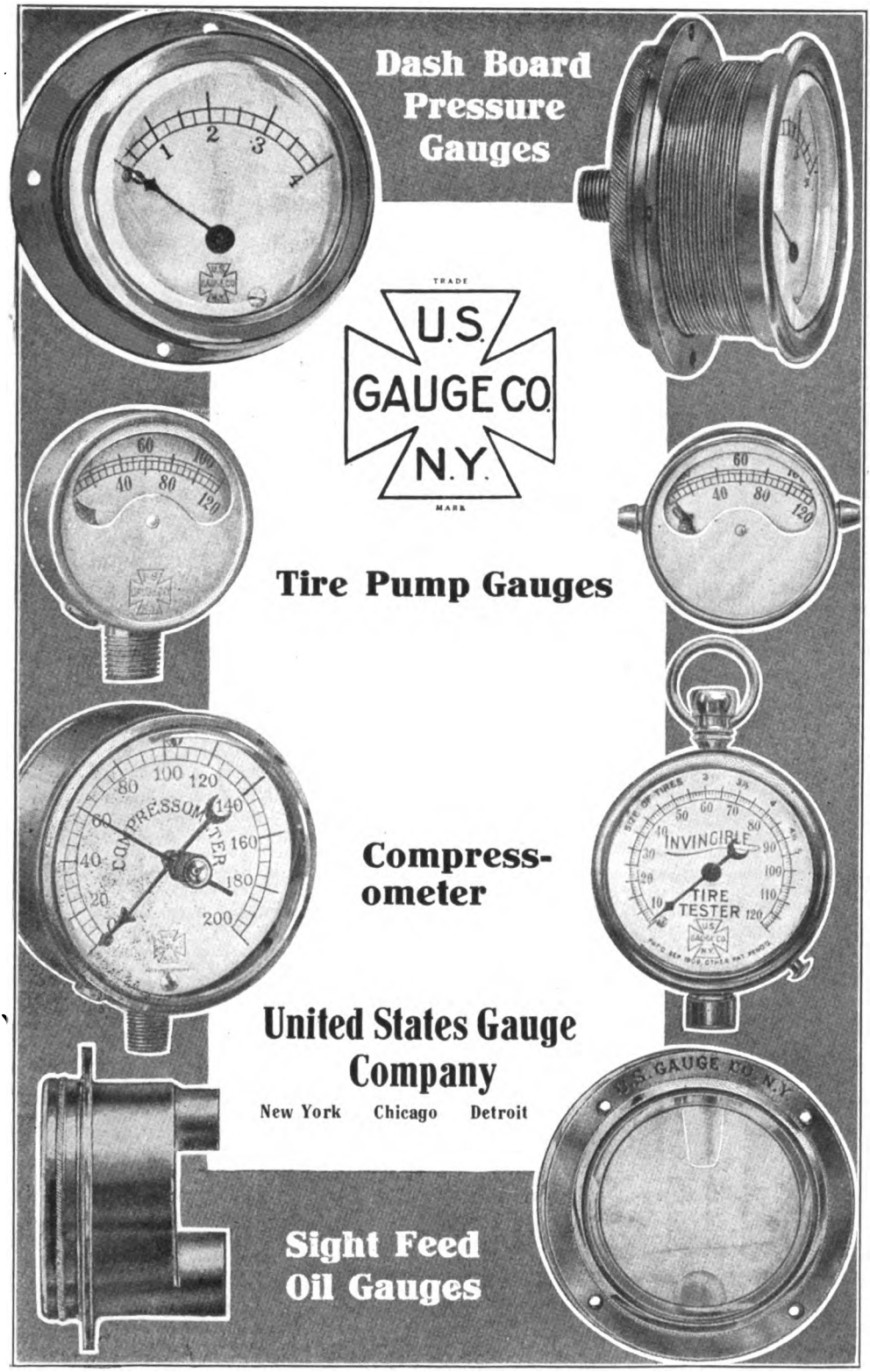

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GEARS (Continued)

STEERING GEARS (Continued)

SUPERIOR Machine & Engineering Co., 51-53 Fort St., E., Detroit, Mich.

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

UNIVERSAL Mfg. Co., Racine, Wis.
(See page 665.)

WARNER Co., T. W., Kilgore & Perkins Aves., Muncie, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 253.)

WARNER Mfg. Co., Toledo, O.
(See page 481.)

WILCOX-McKIM Co., Saginaw, Mich.
(See page 197.)

CYCLECAR TRANSMISSION GEARS

DE LUXE—See Spacke Machine Co.

SPACKE Machine Co., F. W., Indianapolis, Ind. "De Luxe."
(See page 305.)

TRANSMISSION GEARS

ADVANCE Power Co., 517 Aldine Pl., Chicago, Ill.

AMERICAN Die & Tool Co., Second & Buttonwood Sts., Reading, Pa.

AUTOPARTS Mfg. Co., Dept. 1, Detroit, Mich.
(See page 379.)

B-T-K Gear & Engine Co., 620-30 S. Elliott St., Muncie, Ind.
(See page 135.)

BALL—See New York Gear Works.

BARNES Gear Co., Oswego, N. Y.

BIGGAM Engineering Co., Lansing St. & Military Rd., Buffalo, N. Y.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 211.)

BRENNAN Motor Co., 105 Grape St., Syracuse, N. Y.

BROWN-LIPE-CHAPIN Gear Co., Syracuse, N. Y.
(See page 601.)

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

BUDA Co., Harvey, Ill.
(See page 377.)

CAMPBELL—See Economy Equipping Co.

CLIMAX Electric Works, New Salem, Mass.

COTTA Gear Co., Ninth St. & 19th Ave., Rockford, Ill.

COTTA Transmission Co., 814 S. Main St., Rockford, Ill.
(See page 199.)

COVERT Motor Vehicle Co., Detroit, Mich.
(See page 573.)

CROSS Gear & Engine Co., Detroit, Mich.
(See page 553.)

DART Motor Mfg. Co., Waterloo, Ia.

DETROIT Gear & Machine Co., 127-51 Franklin St., Detroit, Mich.

DODGE Bros., 1678-1724 Jos. Campau Ave., Detroit, Mich.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

ECONOMY Equipping Co., Unity Bldg., Chicago, Ill. "Campbell."

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich.
(See page 281.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FROST Gear & Machine Co., Jackson, Mich.
(See page 235.)

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O.
(See page 211.)

JAMESVILLE Mfg. Co., Batavia, N. Y.

LEFEVER Arms Co., 1 Maltbie St., Syracuse, N. Y.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 383.)

MECHANICS Machine Co., Ninth St. & 19th Ave., Rockford, Ill.

MODEL Gas Engine Works, Peru, Ind.
(See page 377.)

MUNCIE Gear Works, Muncie, Ind.

NEW YORK Gear Works, 56-58 Greenpoint Ave., Brooklyn, N. Y. "Ball."
(See page 593.)

PARKER Transmission & Appliance Co., Fulton, N. Y.

ROCHESTER Motors Co., 5 Wren St., Rochester, N. Y.

ROCKFORD Gear Co., Rockford, Ill.

ROSS Transmission Gear Co., Detroit, Mich.

SUPERIOR Machine Tool Co., Kokomo, Ind.

SUPERIOR Machine & Engineering Co., 51-53 Fort St., E., Detroit, Mich.

SYRACUSE Gear Co., 103 Grape St., Syracuse, N. Y.

TURLEY Gear & Machine Co., 1505-11 N. Tenth St., St. Louis, Mo.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Co., T. W., Kilgore & Perkins Aves., Muncie, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 253.)

WARNER Mfg. Co., Toledo, O.
(See page 481.)

WAUKESHA Motor Co., Waukesha, Wis.
(See page 277.)

YUSTER Axle & Transmission Co. of America, South Bend, Ind.

BLANK GEARS

(See also Forgings; also Castings)

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

ANDERSON Forge & Machine Co., Detroit, Mich.
(See page 183.)

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 261.)

Complete Index to Classification appears on Pages 8 to 22.

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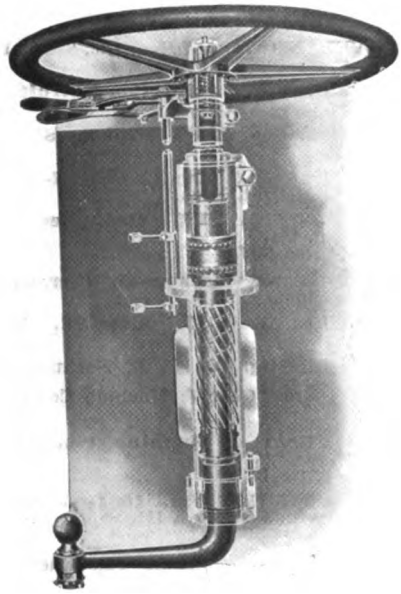

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ARE THE
AMERICAN STANDARD
ON
MOTOR TRUCKS

You will find them in a great majority of motor trucks operating today. Are your trucks equipped with them? If not, they should be. We make better steering gears than you can make—because that is our specialty and we devote our entire time and energy to producing the best possible STEERING GEARS and ROSS DIFFERENTIALS for motor trucks.

Write us for blue prints and catalogue of these two parts.

ROSS GEAR & TOOL CO. **949 Main St., Lafayette, Ind.**

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GEARS (Continued)

BLANK GEARS (Continued)

B. N. D.—See Elliott, H. A.

BILLINGS & Spencer Co., Hartford, Conn.

BLAKESLEE Forging Co., Plantsville, Conn.

CLEVELAND Hardware Co., Cleveland, O.

COLUMBUS Forge & Iron Co., Columbus, O.

DETROIT Screw Works, Detroit, Mich.
(See page 661.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "B. N. D."

GANSCHOW Co., Wm., 1001-05 Washington Blvd., Chicago, Ill.
(See page 593.)

GENERAL Drop Forge Co., 1740 Elmwood Ave., Buffalo, N. Y.
(See page 187.)

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 447.)

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O.
(See page 211.)

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 429.)

JOLIET Forge Co., Irving & Franklin Sts., Joliet, Ill.

KRUPP—See Prosser & Son.

McINNES Steel Co., Corry, Pa.

MICHIGAN Screw Co., Lansing, Mich.

NEW England Forge Co., 9 Plymouth St., Worcester, Mass.

OBENBERGER Drop Forge Co., Cudahy, Wis.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O.
(See page 359.)

METAL GEARS AND PINIONS

ADAMS Co., Dubuque, Ia.

ALBAUGH-DOVER Co., 2100 Marshall Blvd., Chicago, Ill.
(See page 221.)

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

ANDERSON Rolled Gear Co., Berea Rd. & L. S. & M. S. R. R., Cleveland, O.

ARTHUR Co., 188 Front St., New York, N. Y.

BEHRENDT, H. F., 22 Green St., Newark, N. J.

BILGRAM Machine Works, 1235 Spring Garden St., Philadelphia Pa.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 211.)

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CINCINNATI Gear Co., 1825-33 Reading Rd., Cincinnati, O.

CLEVELAND Worm & Gear Co., 990-92 E. 67th St., Cleveland, O.

CROSS Gear & Engine Co., Detroit, Mich.
(See page 553.)

CURRIE & Son, J. B., 72 Adams St., Brooklyn, N. Y.

DETROIT Gear & Machine Co., 127-51 Franklin St., Detroit, Mich.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

EARLE Gear & Machine Co. (Germantown). Philadelphia, Pa.

ELLIS Co., W. E., 357 River St., Haverhill, Mass.

FLATHER Mfg. Co., E. J., Nashua, N. H.

FOOTE Bros. Gear & Machine Co., Chicago, Ill.

FROST Gear & Machine Co., Jackson, Mich.
(See page 235.)

GANSCHOW Co., Wm., 1001-05 Washington Blvd., Chicago, Ill.
(See page 593.)

GEAR Grinding Machine Co., Chene St. & Boulevard, Detroit, Mich.

GLEASON Works, 1100 University Ave., Rochester, N. Y.

GOULD & Eberhardt, N. J. R. R. Ave. & Green St., Newark, N. J.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O.
(See page 211.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HOOSIER Motor Co., Goshen, Ind.
(See page 567.)

KEYSTONE-HINDLEY Gear Co., Pennsylvania Bldg., Philadelphia, Pa.

KRUPP—See Prosser & Son.

MEISEL Press Mfg. Co., 944-48 Dorchester Ave., Boston, Mass.

MUNCIE Gear Works, Muncie, Ind.

NEW England Gear Works, 100 Purchase St., Boston, Mass.

NEW Process Gear Corp., Syracuse, N. Y.
(See page 201.)

NEWARK Gear Cutting Machine Co., 69 Prospect St., Newark, N. J.

NILSON-MILLER Co., 13th & Hudson Sts., Hoboken, N. J.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

NUTTALL Co., R. D., McCandless St. & Harrison Ave., Pittsburg, Pa.

PENNSYLVANIA Gear Works, 437 N. Broad St., Philadelphia, Pa.

PHILADELPHIA Gear Works, 1120 Vine St., Philadelphia, Pa.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

ROSS Gear & Tool Co., 949 Main St., Lafayette, Ind.
(See page 195.)

ROSS Machine Co., 208 S. Fourth St., La Fayette, Ind.

RUSSEL Wheel & Foundry Co., Detroit, Mich.

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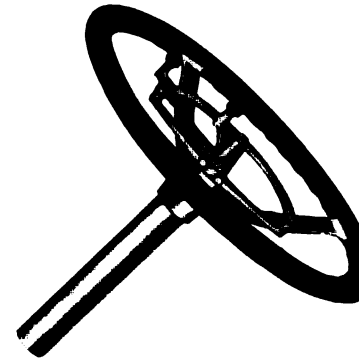
"Safety First"

Jacox

Steering Gears



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We Will Build 150,000 Steering Gears for 1915 Cars.

They Must Be Right.

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STEERING GEARS
CONTRACT MACHINE
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Detroit, Mich. 910 Ford Bldg.

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Saginaw, Michigan

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GEARS (Continued)

METAL GEARS AND PINIONS (Continued)

SAWYER Gear Works, 227 St. Clair St., Cleveland, O.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 533.)

SOUTH Park Mfg. Co., Port Huron, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 305.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

T. C. M. Mfg. Co., Hunterdon & First Sts., Harrison, N. J.

TURLEY Gear & Machine Co., 1505-11 N. Tenth St., St. Louis, Mo.

VAN Dorn & Dutton Co., Cleveland, O.
(See page 471.)

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 253.)

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

WORCESTER Gear Works, 31 N. Foster St., Worcester, Mass.

RAWHIDE GEARS AND PINIONS

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 211.)

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

ELLIS Co., W. E., 357 River St., Haverhill, Mass.

FROST Gear & Machine Co., Jackson, Mich.
(See page 235.)

GANSCHOW Co., Wm., 1001-05 Washington Blvd., Chicago, Ill.
(See page 593.)

MEISEL Press Mfg. Co., 944-48 Dorchester Ave., Boston, Mass.

NEW England Gear Works, 100 Purchase St., Boston, Mass.

NEW Process Gear Corp., Syracuse, N. Y.
(See page 201.)

NUTTALL Co., R. D., McCandless St. & Harrison Ave., Pittsburg, Pa.

PHILADELPHIA Gear Works, 1120 Vine St., Philadelphia, Pa.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 533.)

SYRACUSE Rawhide Mfg. Co., Niagara & Shonnard Sts., Syracuse, N. Y.

WOBURN Gear Works, 32 Nashua St., Woburn, Mass.

GENERATORS

ACETYLENE GAS GENERATORS

(For Acetylene Tanks—See Tanks, Acetylene)

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 243.)

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BROWN Mfg. Co., John W., Columbus, O.

CARBO-LIGHT Co., Pittsburg, Pa.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill.

COLUMBIA—See Hine-Watt Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Handy."

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 207.)

GRAY & Davis, Boston, Mass.
(See page 407.)

HANDY—See Dietz Co.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn. "Old Sol."

HINE-WATT Mfg. Co., 180 N. Market St., Chicago, Ill. "Columbia."

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.

NEVEROUT—See Rose Mfg. Co.

NEW YORK Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

OLD SOL—See Hawthorne Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J.
(See page 245.)

SOLAR—See Badger Brass Mfg. Co.

STERLING Machine & Stamping Co., Wellington, O.

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

TANK O' GAS Co., 25 Bramhall St., Portland, Me.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR Lamp Co., Colerain & Sassafras Sts., Cincinnati, O.

GLASS

POLISHED PLATE GLASS

HARRIS, Chas. H., 142-46 W. 24th St., New York, N. Y.
(See page 199.)

WIRE GLASS

(For use in Glass Fronts and Wind Shields)

MISSISSIPPI Wire Glass Co., 220 Fifth Ave., New York, N. Y.

GLASSES

GAUGE AND LUBRICATOR GLASSES

BACHE & Co., Semon, West & Hubert Sts., New York, N. Y.

LIPPINCOTT Glass Co., Alexandria, Ind.

MONCRIEFF—See Rogers Co.

ROGERS Co., H. A., 87 Walker St., New York, N. Y. (Importers.) "Moncrieff."

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GLASS OF HIGHEST QUALITY

We specialize in absolutely perfect glass of uniform thickness for closed Automobile Body Work, Frameless Windows and Windshields.

Special facilities for Polishing Edges on Glass.

(Factory on Premises.)

Complete stock of Glass 1/8"—3/16"—1/4" thickness.

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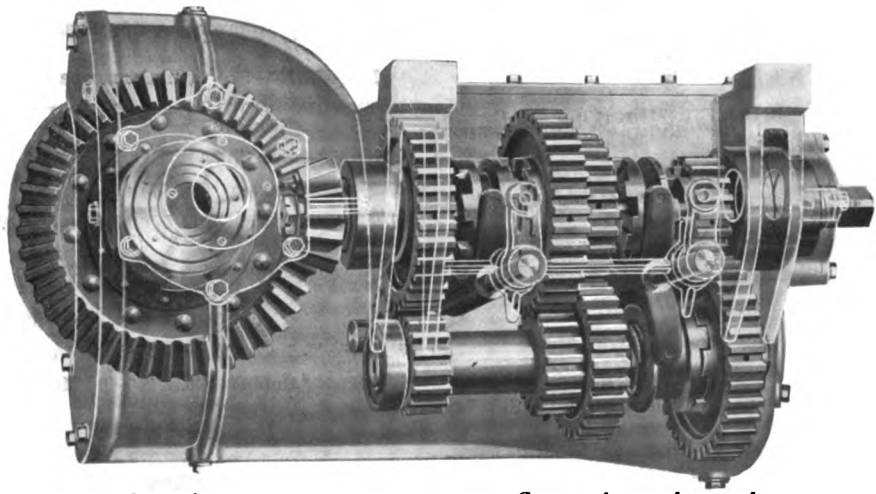
FOR
TRUCKS and TRACTORS



Selective type **Gears always in mesh**
No Plain Bearings—Mainshaft gears mounted on Roller bearings

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GLOVES

MOTORISTS GLOVES AND GAUNTLETS

ADIRONDACK—See Spear-Martin Fur Co.

ALLEN & Sons, John C., Gloversville, N. Y.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

AMERICAN Glove Co., 2013 Churchill St., Chicago, Ill.

BELOIT Glove & Mitten Co., Cross & Back Sts., Beloit, Wis.

BISHOP Co., J. H., Wyandotte, Mich.

BLACK GHOST—See Heagle, James.

BOSS Mfg. Co., Front & Washingon Sts., Brooklyn, N. Y.

BRADFORD, R. E., 51 E. Fulton St., Gloversville, N. Y.

CARRON & Co., 311 W. 59th St., New York, N. Y.

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

EISENDRATH Glove Co., Armitage & Elston Aves., Chicago, Ill.

ELLSWORTH & Thayer Mfg. Co., 336-40 Broadway, Milwaukee, Wis. "Kantryp."

FRIED-OSTERMANN-MEYER Co., 617 Reed St., Milwaukee, Wis. "Price."

GLOVERSVILLE Auto Glove Co., 42 Grand St., Gloversville, N. Y. "M. W. M."

GRINNELL—See Morrison-Ricker Mfg. Co.

GRIP-TITE—See Morrison-Ricker Mfg. Co.

HANSEN Mfg. Co., O. C., Detroit & Milwaukee Sts., Milwaukee, Wis.

HEAGLE, James, First Ave. & Market St., Johnstown, N. Y. "Black Ghost."

KANTRYP—See Ellsworth & Thayer Mfg. Co.

LUTHER Glove Co., J. P., Berlin, Wis. "Red Ball."

M. W. M.—See Gloversville Auto Glove Co.

MORAWETZ Co., 217-25 E. Water St., Milwaukee, Wis.

MORRISON-RICKER Mfg. Co., 72 Broad St., Grinnell, Ia. "Grinnell," "Rist-Fit." "Grip-Tite."
(See page 211.)

NORTHROP—See Syracuse & Eldridge Glove & Legging Co.

PONTIAC Knitting Co., Pontiac, Mich.

PRICE—See Fried-Ostermann-Meyer Co.

RED BALL—See Luther Glove Co.

RIPON Knitting Works, Ripon, Wis.

RIST-FIT—See Morrison-Ricker Mfg. Co.

SINCLAIR Glove Co., 204 E. Ninth St., Los Angeles, Cal.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

SYRACUSE & Eldridge Glove & Legging Co., 1020 S. Salina St., Syracuse, N. Y. "Northrop."

WALLACE Co., Hugh, 2626 E. Grand Boulevard, Detroit, Mich.
(See page 351.)

GOGGLES

MOTORISTS GOGGLES AND EYE SHIELDS

ALBEX—See Willson & Co.

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co

BOSTON—See Chicago Eye Shield Co.

CHEYENNE—See Chicago Eye Shield Co.

CHICAGO Eye Shield Co., 128 S. Clinton St., Chicago, Ill. "Boston," "Rex," "Panama," "Cheyenne."

CHICAGO Optical Co., 1934-36 W. North Ave., Chicago, Ill.

COOKS—See Iowa Optical Co.

COPTIC—See Chicago Optical Co.

EFF & SEE—See Frank & Connet.

ESSEX Rubber Co., Trenton, N. J.

FRANK & Connet, 71-73 Nassau St., New York, N. Y. "Eff & See."

FRIEDLANDER & Bro., Joseph, 8 Maiden Lane, New York, N. Y.

GENERAL Optical Co., 538-40 First Ave., New York, N. Y. "Gogglette."

GLOBE Optical Co., Boston, Mass.

GOGGLETTE—See General Optical Co.

IOWA Optical Co., New London, Ia. "Cooks."

KING Optical Co., F. W., Ellastone Bldg., Cleveland, O.

KING Optical Co., Julius, 10-12 Maiden Lane, New York, N. Y.

LEASURE Eye & Nose Shield Co., 4 Sanford St., Bradford, Pa.
(See page 587.)

LLOYD Co., Andrew J., 315 Washington St., Boston, Mass. (Importers.)

NON-STRAIN—See Opthalmuscope Co.

OPTHALMUSCOPE Co., 437 Dorr St., Toledo, O. "Non-Strain."

PANAMA—See Chicago Eye Shield Co.

REX—See Chicago Eye Shield Co.

SPENCER Optical Co., 5-7 Maiden Lane, New York, N. Y.

SUSSFELD, Lorsch & Co., 90 Maiden Lane, New York, N. Y.

WHITE-HAINES Optical Co., Columbus, O.

WILLSON & Co., T. A., Reading, Pa. "Albex."

YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J.

GONGS

MECHANICAL GONGS

(See Bells, Mechanical)

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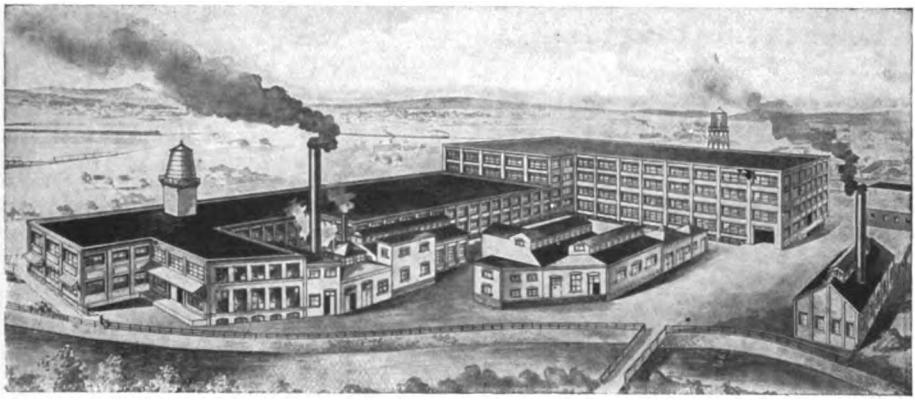

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Constant increase in orders on contract work in metal gear cutting has again called for greater capacity in our plant.

We have therefore erected additions as shown and have added new equipment that practically doubles our facilities, thus making our complete plant *the largest in the world devoted exclusively to gear making and gear cutting.*

Our equipment now covers every requirement of quantity production of gears of any type, and includes Gleason bevel gear generators, Gould & Eberhardt blocking machines, Fellows gear shapers, Brown & Sharpe gear cutters, Gould & Eberhardt hobbing machines, Pratt & Whitney spiral threading machines, National Acme, Cleveland, Gridley and Potter & Johnston automatic lathes and Landis and Heald grinders. The hardening and heat treating department has been enlarged and six Gleason rotary oil furnaces installed in addition to our eight carbonizing furnaces, together with an oil refrigerating plant for regulating the temperature of the oil. A laboratory has also been added for the testing and analysis of the various alloy steels and gear metals used.

We stand ready to quote more attractive prices on quantity orders than ever. Send us your blue prints for estimate.

You can't put your gear work into better hands

NEW PROCESS GEAR CORPORATION

SYRACUSE, N.Y

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GRAPHITE

LUBRICATING GRAPHITE

(For Graphite Grease—See Lubricants)

DIXON Crucible Co., Joseph, Jersey City, N. J.
(See page 467.)

INTERNATIONAL Acheson Graphite Co., Niagara Falls, N. Y.

UNITED States Graphite Co., Saginaw, Mich.

WISCONSIN Graphite Co., Stevens Point, Wis.

GREASES

CUP AND GEAR GREASES

ACHESON Oildag Co., Port Huron, Mich. "Gredag."

ADAMS Grease & Oil Co., 161 W. 51st St., New York, N. Y.

ADVANCE Oil Works, 310-12 Flushing Ave., Brooklyn, N. Y.

AJAX Oil & Grease Co., 170 W. 65th St., New York, N. Y.

ALBANY Lubricating Co., 708-10 Washington St., New York, N. Y. "Cooks."

ALEXANDER & Co., H. T., 17 Battery Pl., New York, N. Y. "Grand Prix."

AMALIE—See Sonneborn Sons.

AMERICAN—See Miller Co.

AMERICAN Oil Co., Jackson, Mich. "Amoco," "Amoilco."

AMOCO—See American Oil Co.

AMOILCO—See American Oil Co.

ARCO—See Atlantic Refining Co.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland, O. "Arco."

ATLAS—See Swan & Finch Co.

AURORA—See Pigot-Sayre Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich. "Diamond Cross."

AUTOGREASE—See Ilsley, Doubleday & Co.

BADGER—See Wadhams Oil Co.

BAKER, Wm. T., 220-32 Suydam Ave., Jersey City, N. J. "Safeguard."

BALKAN—See Jones, C. D.

BANNER—See Clarkson & Ford Co.

BANNER—See Cortland Specialty Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BESLY & Co., Charles H., Chicago, Ill. "Helmet."

BISON—See Cataract Refining & Mfg. Co.

BLIVEN & Carrington, 116 Broad St., New York, N. Y. "E-Z-Way."

BORNE, Scrymser Co., 80 South St., New York, N. Y. "Colo," "Silex."
(See page 287.)

BUCK & Co., E. A., Worcester, Mass.

CALYPSOL—See Cataract Refining & Mfg. Co.

CAROLENE—See Valley Oil Co.

CASCADE—See Cataract Refining & Mfg. Co.

CATARACT Refining & Mfg. Co., Marine National Bank Bldg., Buffalo, N. Y. "Bison," "Calypsol," "Cascade."

CHAINOLENE Mfg. Co., Phipps Power Bldg., Pittsburg, Pa.

CINCINNATI Oil Works Co., Cincinnati, O.
(See page 143.)

CLARKSON & Ford Co., 55 Water St., New York, N. Y. "Banner."

CLIMAX—See Sweet, Charles F.

COLO—See Borne, Scrymser Co.

CONNECTICUT Oil Co., 549 S. Leonard St., Waterbury, Conn.

COOKS—See Albany Lubricating Co.

CORTLAND Specialty Co., 176 Railroad St., Cortland, N. Y. "Banner."

CRANE & Co., 91 Oliver St., Boston, Mass. "Eureka."

CROWN—See Kellogg & Co.

DETROIT—See Zurn Co.

DIAMOND CROSS—See Auto Oil Co.

DIRIGO—See Platt & Washburn Oil Co.

DIXON Crucible Co., Joseph, Jersey City, N. J.
(See page 467.)

DRAKE Oil Co., 99 Spring St., Titusville, Pa.

DUPLEX—See Enterprise Oil Co.

E. P. L.—See Emery Pneumatic Lubricator Co.

E-Z-WAY—See Bliven & Carrington.

EAGLE Oil & Supply Co., Boston, Mass. "Eagleine."
(See page 293.)

EAGLEINE—See Eagle Oil & Supply Co.

ECONOMY—See Pennsylvania Lubricating Co.

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

EMERY Pneumatic Lubricator Co., 1932 N. Broadway, St. Louis, Mo. "E. P. L."

EMPIRE—See Richardson Lubricating Co.

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

ENTERPRISE Oil Co., 150 Chandler St., Buffalo, N. Y. "Duplex."

EUREKA—See Crane & Co.

EXCELSIOR—See Kellogg & Co.

EXCELSIOR—See Miller's Sons.

EXCELSIOR—See Mills Oil Co.

FAULTLESS—See Hawkeye Oil Co.

FIAT—See Pennsylvania Oil Works Co.

FIBROVISCOS—See Sheppard, W. S.

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Lubroleine."

FRANK Oil Co., Titusville, Pa.

FRANKLIN Oil Works, Franklin, Pa.

FULCRUM Oil Co., Franklin, Pa.

GERMANIC—See Wood Co.

GOLD MEDAL—See Monarch Mfg. Co.

GRAND PRIX—See Alexander & Co.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O.

GREDAG—See Acheson Oildag Co.

Complete Index to Classification appears on Pages 8 to 22.

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Motorists Always Come Back For More—

HARRIS

TRADE MARK REG. U.S. PAT. OFF.

OILS

Because HARRIS OILS are exceptional lubricants. They are pure, non-carbonizing, absolutely free from impurities. They are refined from Premium Pennsylvania Crude stock by a special process based on twenty-eight years' experience.

HARRIS CYLINDER OIL—made in three grades—light, medium, and heavy. Motors lubricated with HARRIS CYLINDER OIL remain free from soot deposit and gummed up valves and spark plugs; they run freely and smoothly, because all moving parts are thoroughly covered by a clinging film of pure oil.

HARRIS

TRADE MARK REG. U.S. PAT. OFF.

TRANS

COMPOUND

A pure oil reduced to the consistency of a grease. Being an Oil and NOT a grease, it sticks to metal gears, meshes in with the teeth, and will not squeeze out. Transmissions lubricated with HARRIS TRANSCOMPOUND show practically no wear after years of use, for this pure gear lubricant is friction's greatest enemy.

TO DEALERS:—The sale of HARRIS OILS will bring you satisfied customers—who come back time and again because they know the value of "America's Leading Lubricants." You owe it to your business to carry HARRIS OILS.

"A Little Goes A Long Way And Every Drop Counts"

A. W. HARRIS OIL COMPANY

326 S. Water St., Providence, R. I. **143 N. Wabash Ave., Chicago, Ill.**

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GREASES (Continued)

CUP AND GEAR GREASES (Continued)

GREE-NO-CO—See Greenslade Oil Co.

GREEN Seal Grease Co., Broad & Wallace Sts., Philadelphia, Pa.

GREENSLADE Oil Co., 40 Jefferson Ave., Detroit, Mich. "Gree-no-co."

GREOIL—See Robinson & Son Co.

HAGGERTY Refining Co., 50 South St., New York, N. Y. "Thermo."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I.
(See page 203.)

HARRIS & Co., Elmer E., 2 Maurice St., Buffalo, N. Y.

HARRISON Agalite Lubricating Co., Syracuse, N. Y.

HAVOLINE—See Indian Refining Co.

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HAWS, George A., 62 Pine St., New York, N. Y. "Panhard."
(See page 289.)

HELMET—See Besly & Co.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

ILSLEY, Doubleday & Co., 229-31 Front St., New York, N. Y. "Autogrease."

INDIAN Refining Co., 17 Battery Pl., New York, N. Y. "Havoline."

INVADER Oil Co., 80 Broad St., New York, N. Y.

JONES, C. D., 429 Locust St., Philadelphia, Pa. "Balkan."

KANTER Co., R. J., 647 Water St., New York, N. Y.

KELLOGG & Co., E. H., 242-44 South St., New York, N. Y. "Crown." "Excelsior."

KENDALL Refining Co., Bradford, Pa. "Royal."

KEYSTONE Lubricating Co., 21st & Clearfield Sts., Philadelphia, Pa.

KILNOYS—See Miller Co.

LIBERTY BELL—See Bell Oil Co.

LION—See Moore Oil Co.

LOOS & Dilworth, 134 S. Front St., Philadelphia, Pa. "Paragon."

LUBROLEINE—See Fiske Bros. Refining Co.

McLEAN-JONES Oil & Supply Co., 40 India Wharf, Boston, Mass. "Swastika."

MARATHON—See New York Oil & Grease Co.

METEOR—See Narragansett Chemical Co.

MICAFLAKE—See U. S. Mica Mfg. Co.

MILLER Co., Wm. P., 244-50 Greene St., Brooklyn, N. Y. "American." "Kilnoys."

MILLER'S Sons, Wm. P., 298-302 Hancock St., Long Island City, N. Y. "Excelsior."

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Perfection."

MILLS Oil Co., C. E., 263 Walton St., Syracuse, N. Y. "Excelsior."

MONARCH Mfg. Co., Council Bluffs, Io "Gold Medal."

MONOGRAM—See New York Lubricating Co.

MOORE Oil Co., York St. & McLean A Cincinnati, O. "Lion."

MORRIS & Co., Richard S., Chicago, Ill.

MOTORLIGHT—See Petroleum Coke Co.

MOTORLUBE—See Tygert Co.

NAPOLEON—See Van Tilburg Oil Co.

NATIONAL Refining Co., Rose Bldg., Cle land, O.

NARRAGANSETT Chemical Co., 155-61 Oran St., Providence, R. I. "Meteor."

NATIONAL Oil & Supply Co., Essex & Fl Sts., Harrison, N. J. "Viscos."

NEW York Lubricating Oil Co., 1 Broad St., New York, N. Y. "Mon gram."
(See page 539.)

NEW York Oil & Grease Co., 128 Maid Lane, New York, N. Y. "Marathon."

NEW York & New Jersey Lubricant Co., 1 Broadway, New York, N. Y. "Non-Fluid

NOBETR—See Sawyer Oil Co.

NON-FLUID—See New York & New Jers Lubricant Co.

NORTHWESTERN Chemical Co., Mariett O.
(See pages 143 and 551.)

OIL City Oil & Grease Co., 365-77 Seneca S Oil City, Pa. "Pensoil."

OIL Products Co., 17 Battery Pl., New Yor N. Y. "Usoline."

OILZUM—See White & Bagley Co.

ORIENTAL—See Reliance Oil & Grease Co.

OTTOMO—See Pioneer Mfg. Co.

OWL—See Western Chemical Mfg. Co.

PALUBCO—See Pennsylvania Lubricating C

PANAMA Oil & Grease Co., 159-61 W. 51s St., New York, N. Y.

PANHARD—See Haws, Geo. A.

PARAGON—See Loos & Dilworth.

PARAGON Refining Co., Front St., Toledo, C "Polar."

PATTERSON Lubricating Co., 114 Broad St Boston, Mass.

PENN—See Pennsylvania Lubricating Co.

PENN Oil & Supply Co., Chicago, Ill.

PENNSYLVANIA Lubricating Co., 34th St. & A. V. Ry., Pittsburg, Pa. "Penn," "Sylvan, "Economy," "Palubco."

PENNSYLVANIA Oil Works Co., 72 Front St New York, N. Y. "Fiat," "Zenith."

PENSOIL—See Oil City Oil & Grease Co.

PERFECTION—See Millers Sons Co.

PERFECTION—See Wood Co.

PERFECTO—See Young & Kimball.

PERRY Oil Co., 372 Central Ave., Pawtucket R. I.

PETROLEUM Coke Co., Edgemont & Ve nango Sts., Philadelphia, Pa. "Motorlight."

PETROLEUM Products Co., 3600-10 Grant Blvd., Pittsburg, Pa. "Sound Proof."

PHILADELPHIA Grease Mfg. Co., 848-50 S. Swanson St., Philadelphia, Pa.

PIGOT-SAYRE Co., 71-73 Front St., New York, N. Y. "Aurora."

Complete Index to Classification appears on Pages 8 to 22.

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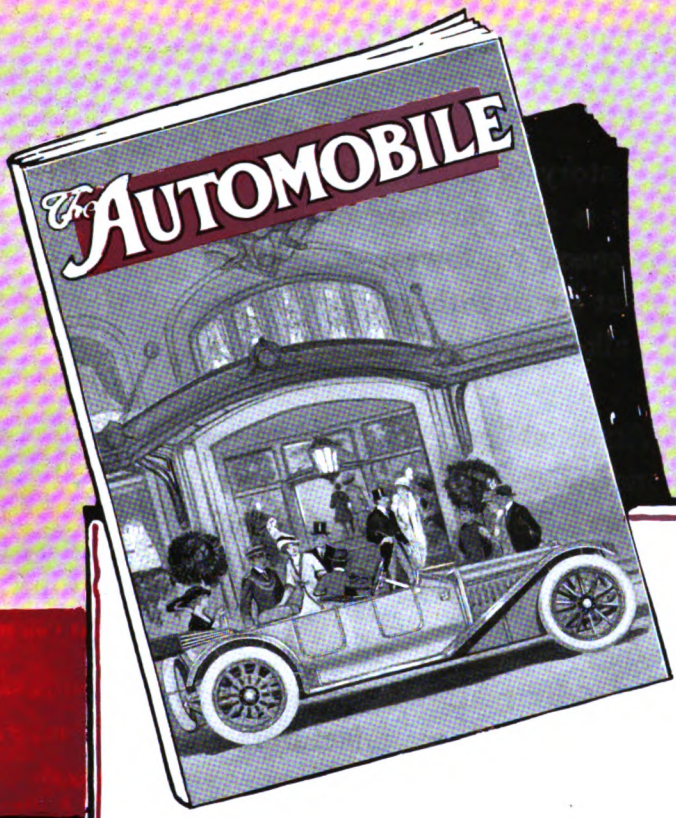

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The **Automobile** and **Motor Age** are the pioneer class publications of automobiledom. They are presented each week to more than 40,000 paid-in-advance subscribers. Because of editorial dignity and worth they are appreciated by motorists, by dealers, by engineers and by manufacturers of cars, trucks and accessories.

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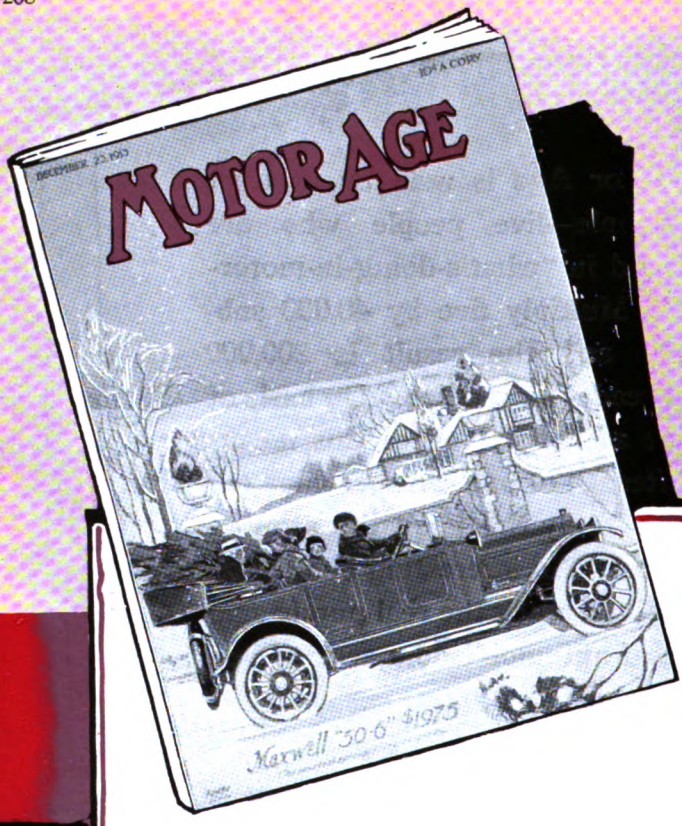

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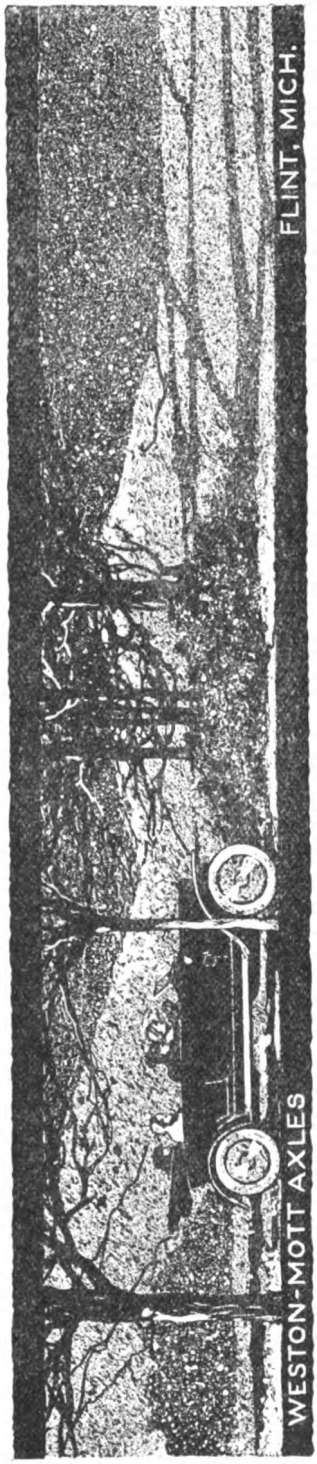

Tested—Tried—True

Designed and built by men of recognized ability.

Backed by a company of unquestioned financial standing.

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GREASES (Continued)

CUP AND GEAR GREASES (Continued)

PIONEER Mfg. Co., 5220 Sweeney Ave., S. E., Cleveland, O. "Ottomo."

PIONEER Oil Co., Old South Bldg., Boston, Mass.

PLATT & Washburn Oil Co., 11 Broadway, New York, N. Y. "Dirigo."

POLAR—See Paragon Refining Co.

POLARINE—See Standard Oil Co. of N. Y.

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURITAN—See Pure Oil Co.

PURITAN Oil Co., 1218 W. 70th St., Cleveland, O.

RELIANCE Oil & Grease Co., 1521 Columbus Rd., Cleveland, O. "Oriental."

RICHARDSON Lubricating Co., Quincy, Ill. "Empire."

RIGHT—See Wagner Oil Co.

ROBINSON & Son Co., Wm. C., 32 South St., Baltimore, Md. "Greoil."

ROYAL—See Kendall Refining Co.

SAFEGUARD—See Baker, Wm. T.

SAWYER Oil Co., Howard B., 65 Long Wharf, Boston, Mass. "Nobetr."

SHEPPARD, W. S., 21 Lawrence St., Newark, N. J. "Fibroviscos."

SILEX—See Borne, Scrymser Co.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SOUND PROOF—See Petroleum Products Co.

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

SPERMO—See Warren Lubricant Co.

STANDARD Oil Co. of N. Y., New York, N. Y. "Polarine."

SULLIVAN Oil Co., 413 Wells St., Chicago, Ill.

SUPERIOR Oil Co., Wade Bldg., Cleveland, O.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

SWAN & Co., Alden S., 135 Front St., New York, N. Y. "Swanovia."

SWAN & Finch Co., 151 Maiden Lane, New York, N. Y. "Atlas."

SWANOVIA—See Swan & Co.

SWASTIKA—See McLean-Jones Oil & Supply Co.

SWEET, Charles F., 247 State St., Hartford, Conn. "Climax."

SYLVAN—See Pennsylvania Lubricating Co.

THERMO—See Haggerty Refining Co.

TOCO—See Tropical Oil Co.

TROPICAL Oil Co., W. 70th St. & L. S. & M. S. Ry., Cleveland, O. "Toco."

TULC—See Universal Lubricating Co.

TYGERT Co., E. A., 126 N. Front St., Philadelphia, Pa. "Motorlube."

U. S. Mica Mfg. Co., 234 S. LaSalle St., Chicago, Ill. "Micaflake."

UNITED States Graphite Co., Saginaw, Mich.

UNIVERSAL—See Young & Kimball.

UNIVERSAL Lubricating Co., Schofield Bldg., Cleveland, O. "Tulc."

USOLINE—See Oil Products Co.

VACUUM Oil Co., Rochester, N. Y.

VALLEY Oil Co., Century Bldg., Cleveland, O. "Carolene."

VALVOLINE Oil Co., 11 Broadway, New York, N. Y.

VAN NOSTRAND Mfg. Co., 136 Liberty St., New York, N. Y. "White Circle."

VAN TILBURG Oil Co., 2424-28 University Ave., Minneapolis, Minn. "Napoleon."

VERACITY—See Warren Refining Co.

VELVET—See Sutherland & Co.

VISCO Motor Oil Co., 2104 Superior Viaduct, Cleveland, O.

VISCOS—See National Oil & Supply Co.

VISCOSITY Oil Co., 1101-03 W. 37th St., Chicago, Ill.

WADHAMS Oil Co., Milwaukee, Wis. "Badger."

WAGNER Oil Co., 551 W. 42d St., New York, N. Y. "Right."

WARREN Lubricant Co., 22 Maurice St., Buffalo, N. Y. "Spermo."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O. "Veracity."

WESTERN Chemical Mfg. Co., 151 Sixth St., Milwaukee, Wis. "Owl."

WHITE CIRCLE—See Van Nostrand Mfg. Co.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Oilzum."

WHITMORE Mfg. Co., 33 Iron Ct., Cleveland, O.

WHIZ—See Hollingshead Co.

WONDER WORKER—See Hall-Thompson Co.

WOOD Co., W. A., 373 Atlantic Ave., Boston, Mass. "Perfection," "Germanic."

YOUNG, Orlando W., 130 Freylinghuysen Ave., Newark, N. J.

YOUNG & Kimball, Frank L., 111 Purchase St., Boston, Mass. "Universal." "Perfecto."

ZENITH—See Pennsylvania Oil Works Co.

ZURN Co., O. F., 2736-38 N. Broad St., Philadelphia, Pa. "Detroit."

GRIPS

LEVER HANDLE GRIPS

GOODYEAR Tire & Rubber Co., Akron, O.

PEDAL GRIPS

AUTO Pedal Pad Co., 794 Seventh Ave., New York, N. Y.

CORK Products Co., 1926 Broadway, New York, N. Y. "Kork-Tred."

KORK-TRED—See Cork Products Co.

NON-SLIP Auto Pedal Co., 140 Nassau St., New York, N. Y.

SIDWELL Pedal Mat Co., 245 Columbus Ave., Boston, Mass.

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Equip Your Cars With the

Grant-Lees

Electric Welded Differential

The most satisfactory and efficient differential manufactured. The rivets are electrically welded, leaving no open seams and doubling the assembled strength. Season after season this differential performs its function quietly and perfectly—no noise, no trouble, certain service.

If you would have quiet serviceable and reliable rear axles, specify the

Grant-Lees Electric Welded Differential

The Grant-Lees Gear Co.

G. B. Collings, Pres., C.W. Blossom, Sec'y & Tres.

2368 Sixty-Ninth St., Cleveland O.

Here's The New "Grip-Tite" Style

that's easier on your guiding hand than anything you ever tried. It's the famous, smooth-fitting *Grinnell Glove* which you already know, *plus*—the new "Grip-Tite" reinforcement or double corrugated palm and inner thumb.

Doubles the wear and gives *constant, non-slip* control.

The "Grip-Tite" glove *almost* does the guiding for you.

Grinnell Gloves

Sold with a Bond

Style 4827
Price $3.00 a Pair

are the softest, *toughest,* longest wearing—the smoothest fitting, *most flexible,* and allow the *greatest* finger play of *any* glove you ever wore or could buy. Never peel, harden or crack from use—easily washed in soap and water, or gasoline, and always remain soft and pliable.

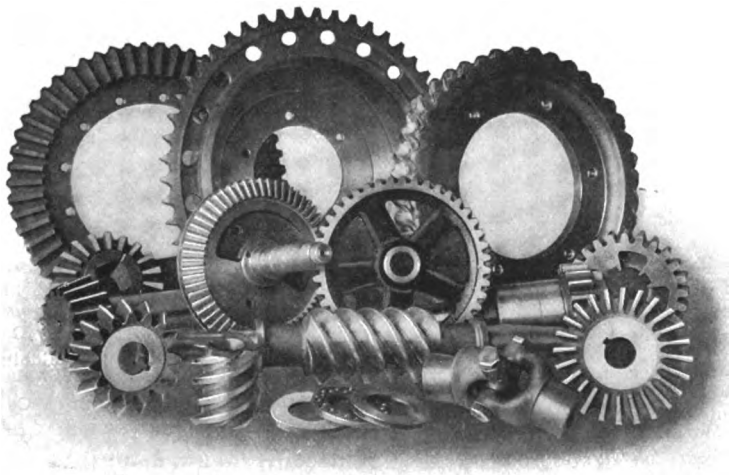
Make repairs, etc., with nimble fingers, gloved and clean. Classy and comfortable. Many styles to suit *your want.* Ask your dealer or write for *catalog* describing these and our street and dress gloves—and get our "Pair on Approval, Prepaid" offer.

MORRISON-RICKER MFG. CO.

Established 1856

72 Broad Street Grinnell, Iowa

BOSTON GEARS



AUTOMOBILE GEARS OF ALL KINDS

HINDLEY SPIRALS A SPECIALTY

Spurs, Bevels, Miters, Worm Gears, Worms, Sprockets, Etc.

In Stock and Made to Order **Send for Catalogue E9 of Stock Gears**

BOSTON GEAR WORKS, NORFOLK DOWNS, MASS.

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GRIPS (Continued)

THROTTLE AND SPARK LEVER GRIPS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

CONDENSITE Co. of America, Belleville Ave., Glen Ridge, N. J.

LUZERNE Rubber Co., Trenton, N. J.

RUBBERSET Co., 56 Ferry St., Newark, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

GUARDS

HORN BULB GUARDS

ASCO—See N. Y. Wire & Spring Co.

N. Y. Wire & Spring Co., 586-88 Washington St., New York, N. Y. "Asco."
(See page 385.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.
(See page 271.)

LEATHER MUD GUARDS AND FENDERS

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

PETERS-HERRON Dash Co., Gift & Culbertson Sts., Columbus, O.

METAL MUD GUARDS AND FENDERS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

BRISCOE Mfg. Co., Detroit, Mich.

BRISKIN-WOLSIEFER Mfg. Co., 541 N. Capitol Ave., Indianapolis, Ind.

BUNN-HUTCHINSON Co., 330 Prospect Ave., N. W., Cleveland, O.

BUSH Mfg. Co., Hartford, Conn.
(See page 225.)

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DAVIES-BACH Mfg. Co., Davies Bldg., Alliance, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

EUREKA Auto Parts Mfg. Co., 3029 Olive St., St. Louis, Mo.

FORSYTH Bros. Co., Harvey, Ill.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

HARTFORD Sheet Metal Works, 325 N. Front St., Hartford, Conn.

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich.
(See pages 78 and 79.)

IDEAL Sheet Metal Works, 2807 Michigan Ave., Chicago, Ill.

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y.
(See page 213.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

LAWSON Co., F. H., Cincinnati, O.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MOLINE Pressed Steel Co. (E. Moline), Moline, Ill.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

PARAGON Auto Parts Mfg. Co., 506 W. 53d St., New York, N. Y.

PERFEX Radiator Co., Racine, Wis.

REID Co., 1603 Second Ave., Moline, Ill.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 140.)

SUSSMAN & Rosenberg Mfg. Co., M., Tarrytown, N. Y.

TODD Mfg. Co., 820-24 Mary Pl., Minneapolis, Minn.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

WOOD MUD GUARDS AND FENDERS

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J.
(See page 83.)

DANN Bros. & Co., 80-88 Franklin St., New Haven, Conn.

GUNS

GREASE GUNS

AGNER Co., Raymond C., Burlington, Wis "Simplex."

B-LINE—See Randall-Faichney Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Maximus."

BIG DANE—See Miller & Starr Co.

BIGSBY Mfg. Co., 7500 Quincy Ave., Cleveland, O.
(See pages 215 and 315.)

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Premium."

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

COX Brass Mfg. Co., Albany, N. Y.
(See page 467.)

DELTA Mfg. Co., Bloomfield, N. J.

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

Complete Index to Classification appears on Pages 8 to 22.

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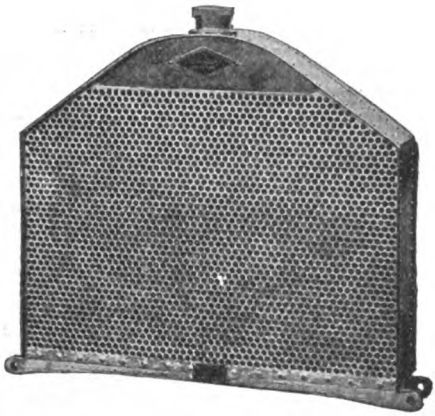


NEW YORK AUTO TRUCK

KNOX

"Kells" Radiator

BEWARE OF IMITATIONS

The Most Durable and Efficient for Commercial Cars

Used on all the leading Gasolene Trucks of America

TEN YEARS TEST has PROVEN THE BEST

HOODS *TANKS* *MUD GUARDS*

Repairing of all kinds on short notice

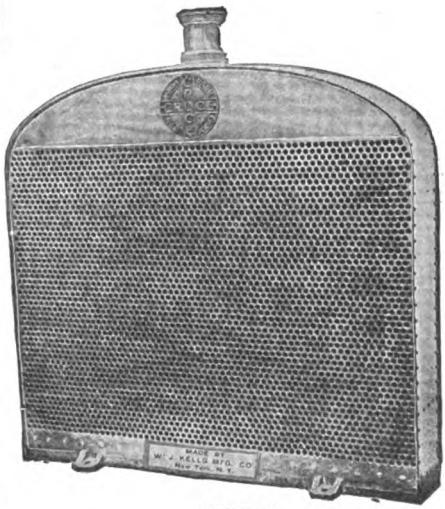
W. J. KELLS MFG. CO.

521-523-525 WEST 45th STREET

NEW YORK CITY

5TH AVE. COACH

MACK



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GUNS (Continued)

GREASE GUNS (Continued)

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill. "Yankee."

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

HIPWELL Mfg. Co., 831-35 North Ave., W., Pittsburg, Pa.
(See page 231.)

INTERNATIONAL Automobile Supply Co., 117 W. South Water St., Chicago, Ill.
(See page 585.)

LITTLE GIANT—See Neiman Machine Wks.

MAXIMUS—See Beckley-Ralston Co.

MILLER & Starr Co., 250 Green St., Brooklyn, N. Y. "Big Dane."

NEIMAN Machine Works, Freeport, Ill. "Little Giant."

NOERA Mfg. Co., Waterbury, Conn.

PREMIUM—See Blue Ribbon Mfg. Co.

RANDALL-FAICHNEY Co., Boston, Mass. "B-Line."
(See page 229.)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SIMPLEX—See Agner Co.

SUNDERLAND Mfg. Co., 1220 S. Michigan Ave., Chicago, Ill.

TOWNSEND & Co., S. P., Orange, N. J.

WILSON Instrument & Specialty Co., South & Second Sts., Passaic, N. J. "Wisco."

WISCO—See Wilson Instrument & Specialty Co.

YANKEE—See Fowler Lamp & Mfg. Co.

OIL GUNS

AGNER Co., Raymond C., Burlington, Wis. "Simplex."

B-LINE—See Randall-Faichney Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Premium."

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

COPLEY—See Randall-Faichney Co.

CORDEAUX-ETTER Mfg. Corp., 11-15 McKibben St., Brooklyn, N. Y. "Never Fail," "Ever Ready."

COX Brass Mfg. Co., Albany, N. Y.
(See page 467.)

DELTA Mfg. Co., Bloomfield, N. J.

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

EVER READY—See Cordeaux-Etter Mfg. Corp.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill. "Yankee."

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HAUCK-SEEBACH Co., 291-95 Essex St., Brooklyn, N. Y.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y.
(See pages 215 and 527.)

NEVER FAIL—See Cordeaux-Etter Mfg. Corp.

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

NOERA Mfg. Co., Waterbury, Conn.

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn.
(See page 331.)

PREMIUM—See Blue Ribbon Mfg. Co.

RANDALL-FAICHNEY Co., Boston, Mass. "B-Line," "Copley."
(See page 229.)

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SIMPLEX—See Agner Co.

UNIVERSAL—See New York Coach & Auto Lamp Co.

WILSON Instrument & Specialty Co., South & Second Sts., Passaic, N. J. "Wisco."

WISCO—See Wilson Instrument & Specialty Co.

YANKEE—See Fowler Lamp & Mfg. Co.

HAIR

UPHOLSTERY HAIR

ARMOUR Curled Hair Works, 31st Pl. & Benson Sts., Chicago, Ill.

BENTLEY Hair Co., Joseph, Methuen, Mass.

DELANY & Co., 209 N. Third St., Philadelphia, Pa.

DOMINO—See Morris & Co.

GORDON Bros., Pierce & Orthodox Sts. (Frankford), Philadelphia, Pa.

KOHLMANN Moss & Cotton Felt Mfg. Co., 1224-30 St. Thomas St., New Orleans, La.

MITCHELL Co., P. R., Spring Grove & Harrison Aves., Cincinnati, O.

MORRIS & Co., U. S. Yards, Chicago, Ill. "Peerless," "Domino."

PEERLESS—See Morris & Co.

S. & S.—See Sulzberger & Sons Co.

SULZBERGER & Sons Co., Chicago, Ill. "S. & S."

WILKENS Co., Wm., Frederick Ave. & Wilkens St., Baltimore, Md.

WOLL & Co., F. P., Church & Tacony Sts. (Frankford), Philadelphia, Pa.

WOLL & Sons Mfg. Co., Peter, Hancock & Berks Sts., Philadelphia, Pa.

HAMPERS

TOURING HAMPERS, BASKETS AND LUNCH BOXES

(See also Trunks, Automobile)

AMESBURY Reed & Rattan Co., Bailey Bldg., Amesbury, Mass.

BUBECK & Guerin, 161-63 W. 18th St., New York, N. Y. "Easypack."
(See page 493.)

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Hawkeye
Refrigerator Baskets

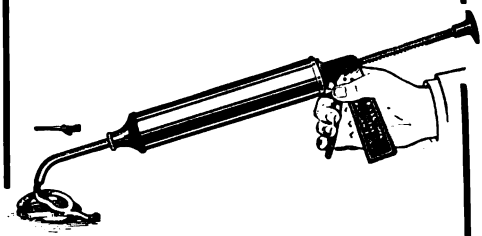
3 lbs. of ice keeps drinks and lunch deliciously cool in one of these baskets in hottest weather. Indispensable to motorists when touring or persons who enjoy an outdoor lunch. Baskets are made of rattan, strong and durable. Asbestos lining with nickel plated metal inner lining. Not expensive. Sold by first-class supply dealers, sporting goods and department stores. Write for catalog and prices.

Hawkeye
Fitted Lunch Baskets

Are completely equipped with plates, cups, saucers, knives and forks—everything down to napkins, coffee pots and sauce pans. The Hawkeye trade mark inside of the basket guarantees the quality. Write for booklet showing full line of Hawkeye Refrigerator and Outing baskets. Our extensive magazine advertising will create a big demand. So write to-day.

BURLINGTON BASKET WORKS, Burlington, Iowa

THE BIGSBY
Automatic Grease Gun



Each **$3.00**

Here is a Grease and Oil Gun which you cannot afford to be without. Those parts which are difficult to get at usually get less lubrication than they require because they *ARE* hard to reach. The Bigsby Automatic is easy to load and easy to shoot. Only one hand required to work it.

THE BIGSBY MANUFACTURING CO.

7500 Quincy Ave. CLEVELAND, O.

Every motor car owner needs constant and complete protection against the thief and the joy-rider. The only device that actually *locks* the car is the

NORISKO
Steering Gear and Ignition Lock

Double Type, Price $7.75
Single Type (Steering Gear Only), $6.00
Special Ford Model (single), $6.00

Prevents anyone but the holder of the Corbin key from driving, pushing or pulling the car away. Absolutely thief-proof and fool-proof.

AGGRESSIVE ACCESSORY MEN

everywhere will realize the opportunity for handsome profits afforded by this novel, effective device. Car owners find it a necessity. Send for Special Dealer's Proposition and full information at once.

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707 Abbott Bldg., cor. Broad and Race Sts., Philadelphia, Pa.

Branch Distributors: Auto Specialty Sales Co., U. S. Rubber Bldg., 58th St. & Broadway, New York.

THE VICTOR

GREASE GUN
PAT. APPL'D FOR

EASILY FILLED, as its cylinder measures 3" in Diameter.

HOLDS TWO LBS. OF GREASE, sufficient for any Transmission.

WORKS WITH AIR PRESSURE, and only needs two strokes of our VICTOR PUMP to discharge the two lbs. of grease in THREE SECONDS.

All car now do this hitherto dirty, disagreeable work.

Saving 7/8ths of the time,

Saving soiling hands,

Saving soiling clothes.

We will send any responsible dealer one on thirty days' trial.

Write Now.

Judd & Leland Mfg. Co.

Clifton Springs, N. Y.

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HAMPERS (Continued)

TOURING HAMPERS, BASKETS AND LUNCH BOXES (Continued)

BURLINGTON Basket Works, Burlington, Ia. "Hawkeye."
(See page 215.)

EASYPACK—See Bubeck & Guerin.

HAWKEYE—See Burlington Basket Works.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

SEITZ, C., 275 W. 128th St., New York, N. Y.

HANDLES

DOOR HANDLES

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 341.)

BRAINERD Mfg. Co., East Rochester, N. Y.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

COWLES & Co., C., New Haven, Conn.
(See page 177.)

DOUGLAS & Lomason Co., Detroit, Mich.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y.
(See page 217.)

MERRIMAC Specialty Mfg. Co., Merrimac, Mass.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

PHOENIX Lock Works, 321-27 Third Ave., Newark, N. J.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

ROSTAND Mfg. Co., Milford, Conn.

SARGEANT Mfg. Co., New & Summit Sts., Newark, N. J.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 93.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WHITE Mfg. Co., Bridgeport, Conn.

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

STARTING CRANK HANDLES

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

HELLENBERG & Son, J. B., Jefferson & Clark Sts., Coldwater, Mich.

LUZERNE Rubber Co., Trenton, N. J.

MECHANICAL Rubber Co., C. P. & Nickel Plate R. R., Cleveland, O.

STOKES Rubber Co., Jos., Trenton, N. J.

HANGERS

HAT HANGERS

(Clip for hanging hats on robe rails—See also Racks, Hat)

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

LICENSE HANGERS

(See Holders, License; also Numbers, License)

PRESSED STEEL STEP HANGERS

BOSSERT Co., Utica, N. Y.
(See page 233.)

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 379.)

CROSBY Co., Buffalo, N. Y.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 233.)

DRIGGS-SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 91.)

ROCHESTER Pressed Steel Co., 16 Commercial St., Rochester, N. Y.

HASSOCKS

AUTOMOBILE HASSOCKS

(For Metal Foot Rests—See Rests, Foot)

CHICAGO Hassock Co., 1145 S. State St., Chicago, Ill.

HEADLIGHTS

ACETYLENE HEADLIGHTS

(See Lamps, Acetylene)

ELECTRIC HEADLIGHTS

A. B. Mfg. Co., Poughkeepsie, N. Y.

ADAMS-BAGNALL Electric Co., Cleveland, O.
(See page 243.)

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The Utilization Of Gas In Mechanical Heating Process

IS OUR SPECIALTY. No other kind of fuel can be used to such advantage in manufacturing processes which require Precision in the use of heat. It has many advantages over other fuels.

Case Hardening By Gas

by our new process. The surface of wrought iron or low carbon steel is converted into High Carbon Steel, to any PRACTICAL depth required for case-hardening the exterior uniformly while leaving the core soft.

AUTOMATIC HEAT CONTROLLER

automatically controls the heat in Gas Furnaces to within 5° for hardening or annealing.

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Pressure Blowers, Gas Blast Furnaces, Heating Machines, Blow Pipes and Burners, Case-Hardening Machines, Rotary Annealing Machines with Sealed Retort, Coloring and Tempering Machines.

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Gas Engineers and Manufacturers

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Successors to

M. H. Strong Co., Rochester, N. Y.

Manufacturers of

AUTOMOBILE SPECIALTIES

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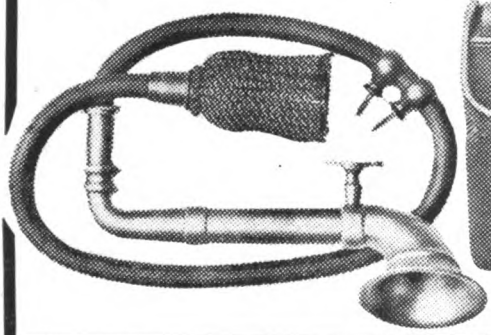

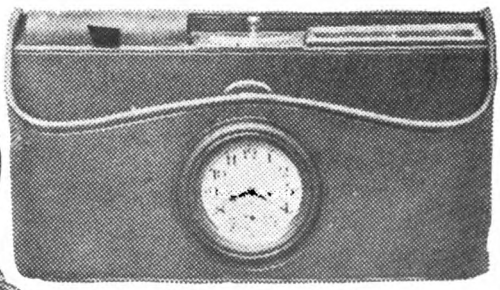

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HEADLIGHTS (Continued)

ELECTRIC HEADLIGHTS (Continued)

APELCO—See Apple Electric Co.

APPLE Electric Co., 16 Canal St., Dayton, O. "Apelco."
(See page 159.)

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J."
(See page 267.)

ESTERLINE Co., 228 E. South St., Indianapolis, Ind. "Golden Glow."

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GOLDEN GLOW—See Esterline Co.

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAMMER Co., E. H., 1839 Euclid Ave., Cleveland, O.

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.

ROFFY-GRACE Corp., 1926 Broadway, New York, N. Y.

MIXTURE HEATERS

(For heating mixture in Carbureter or Manifold to facilitate starting)

ARNOLD Electric Co., 93 Mass. Ave., Boston, Mass.

KRAUSE Mfg. Co., 654 Franklin St., Detroit, Mich.

STAATS & Co., Geo., 252 Lorimer St., Brooklyn, N. Y. "Stalit."

STALIT—See Staats & Co.

TATE—See United Motor Equipment Co.

UNITED Motor Equipment Co., 19 S. La Salle St., Chicago, Ill. "Tate."

VOLCANO Electric Primer Works, Virginia, Ill.

RADIATOR HEATERS

(For keeping radiators from freezing)

CONSOLIDATED Car Heating Co., Singer Bldg., New York, N. Y.

NEVEROUT—See Rose Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

HEATERS

AUTOMOBILE HEATERS

AMERICAN Auto-Heater Co., 160 14th St., Buffalo, N. Y.

AUTO Heater Co. of America, 1148 Bedford Ave., Brooklyn, N. Y. "Four-in-One."

CHICAGO Flexible Shaft Co., 608 La Salle Ave., Chicago, Ill. "Duchess." "Clark."

CINCINNATI Auto Heater Mfg. Co., Liberty & Clay Sts., Cincinnati, O.

CLARK—See Chicago Flexible Shaft Co.

DETROIT Auto Heater Co., Detroit, Mich.

DUCHESS—See Chicago Flexible Shaft Co.

FOUR-IN-ONE—See Auto Heater Co. of America.

GARRISON Gasoline Engine Specialties Co., 251-55 E. Richmond St., Philadelphia, Pa.

HOUSEL Mfg. Co., East Rochester, N. Y.

LEHMAN Bros., 10 Bond St., New York, N. Y. "Queen." "Star."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radio."
(See page 507.)

MOTOR & Mfg. Works Co., Dunkirk, N. Y. "Reid."
(See page 219.)

MOTORIST Warm Grip Co., Marshall, Tex.

PEERLESS Radiator Co., Gibbs, Idaho.

QUEEN—See Lehman Bros.

RADIO—See Milwaukee Auto Specialty Co.

REID—See Motor & Mfg. Works Co.

STAR—See Lehman Bros.

WARM Hand Steering Wheel Corp., Poughkeepsie, N. Y.

FEED WATER HEATERS

NATIONAL Pipe Bending Co., River & Lloyd Sts., New Haven, Conn.

OFELDT & Sons, F. W., Nyack, N. Y.

HINGES

CABINET HINGES

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

STANLEY Works, New Britain, Conn.

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y.
(See page 250.)

DOOR HINGES

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

BRAINERD Mfg. Co., East Rochester, N. Y.

DOUGLAS & Lomason Co., Detroit, Mich.

EBERHARD Mfg. Co., Cleveland, O.
(See page 237.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

GEM—See Parsons Mfg. Co.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

M-A-Z Concealed Hinge Co., Kenosha, Wis.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

PARSONS Mfg. Co., Detroit, Mich. "Gem."
(See page 221.)

SMITH & Co., Jos. N., Detroit, Mich.
(See page 93.)

SOSS Mfg. Co., 435-43 Atlantic Ave., Brooklyn, N. Y.

STANLEY Works, New Britain, Conn.

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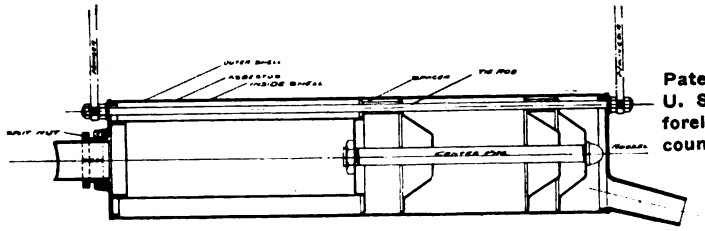
EJECTOR MUFFLERS

The Muffler That Reduces Motor Troubles

In use since 1903



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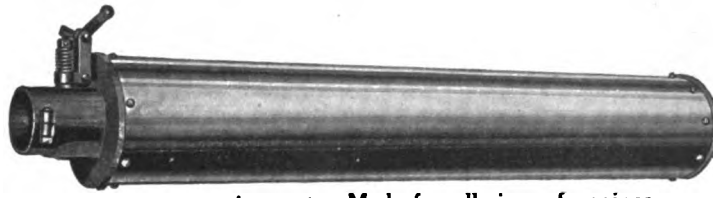
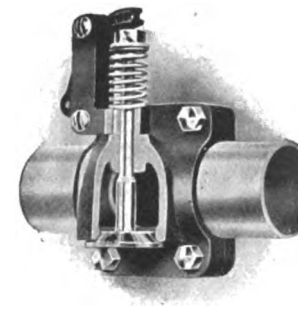
THE ONLY MUFFLER that adjusts itself to all speeds of the engine.
ITS USE INSURES silence, full power of the engine, less heating, less cleaning of cylinders and spark plugs, less motor trouble.
THE EJECTOR DIFFERS from all other silencing devices in that it, by suction, takes the gas through at a velocity in proportion to the speed of the engine.



DESIGNS to suit every requirement. Made for all sizes of engines.
CONNECTIONS to suit all sizes of tube or pipe. Slip, flange or clamp joint. Made with or without cutout valve.

Reid Exhaust Heaters.
Use the waste heat of the exhaust.
First cost only cost.
Makes Auto Riding in winter a pleasure. Easily installed.

Clamp Cutout Valves
Type R.



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We solicit your specifications on all classes of machine work, oil and gasoline tanks.
Address for catalogue and particulars,

MOTOR & MFG. WORKS CO.

Auto Dep't. **DUNKIRK, N. Y.**

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HINGES (Continued)

DOOR HINGES (Continued)

WAINWRIGHT & Son, W. W., 16th St. & Western Ave., Connersville, Ind.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HOOD HINGES

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

BRONSON Co., Homer D., Beacon Falls, Conn.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

SMITH & Co., Jos. N., Detroit, Mich.
(See page 93.)

WATERBURY Brass Goods Corp., 160 Washington Ave., Waterbury, Conn.

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HOISTS

PORTABLE HOISTS

(See Cranes, Portable)

HOLDERS

BATTERY HOLDERS

(See also Boxes, Battery)

BECCO—See Michigan Motor Specialties Co.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Hermetic."

HERMETIC—See Campbell Co.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco."
(See page 523.)

PATTERSON—See Stanley & Patterson.

STANLEY & Patterson, 23 Murray St., New York, N. Y. "Patterson."

BOUQUET HOLDERS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.)

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

GOODWIN & Kintz Co., Winsted, Conn.

HAWKES & Co., T. G., Corning, N. Y.

INTERNATIONAL Silver Co., Meriden, Conn.

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y.
(See page 217.)

LIBERTY Cut Glass Works, Egg Harbor City, N. J.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

STEUBEN Glass Works, Corning, N. Y.

WATSON Co., Mechanics St., Attleboro, Mass.

FLAG, PENNANT AND EMBLEM HOLDERS

ALUMINUM Goods Mfg. Co., Manitowoc, Wis.

AUTO Specialty Co., 2144 Madison Ave., Toledo, O.

BON Tour Mfg. Co., Cobleskill, N. Y.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

J. & J. Mfg. Co., 192 Piquette Ave., Detroit, Mich. "Universal."

LEYMAN-BUICK Co., 630 Walnut St., Cincinnati, O.

UNIVERSAL—See J. & J. Mfg. Co.

LICENSE HOLDERS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALL-AND-CO., Springfield, Mass. "Allen."

ALLEN—See All-And-Co.

APCO—See Auto Parts Co.

AUTO Parts Co., 50 Exchange Pl., Providence, R. I. "Apco."

AUTOMOBILE License Indicator Co., Lewisburg, Tenn. "Perfection." "Standard."

BALZER Co., Gus, 1777 Broadway, New York N. Y.

BASTIAN—See General Utility Co.

BOSTON—See Phillips, Fordham.

BROOKS & Sons, M. S., Chester, Conn.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

DAYTON Malleable Iron Co., Dayton, O.

EBERHARD Mfg. Co., Cleveland, O.
(See page 237.)

FAIRCHILD, H. C., Maplewood, N. J.

GENERAL Utility Co., 1326-30 Ogden St., Philadelphia, Pa. "Bastian."

HALLADAY Co., L. P., Streator, Ill.

LEE Co., Wm. O., Port Huron, Mich.
(See page 125.)

LEYMAN-BUICK Co., 630 Walnut St., Cincinnati, O.

MASCO—See Milwaukee Auto Specialty Co.

MICHIGAN Sign Holder Co., 231-33 N. Ionia Ave., Grand Rapids, Mich.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco."
(See page 507.)

NEVEROUT—See Rose Mfg. Co.

PERFECTION—See Automobile License Indicator Co.

Complete Index to Classification appears on Pages 8 to 22.

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Generated Bevel Gears
Spur Gears
Helical Gears
Worms and
Worm Gears

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If you desire accuracy and workmanship above the average, we are in a position to meet your requirements

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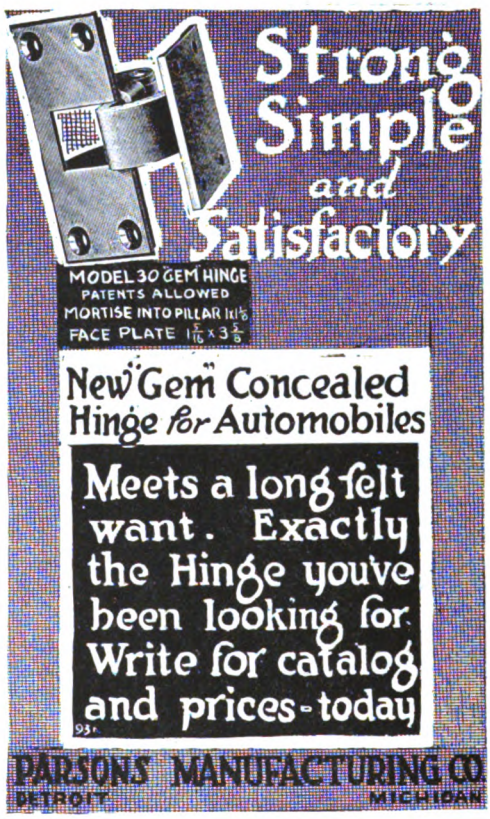

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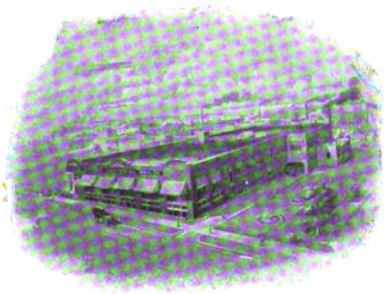
Malleable, Brass & Aluminum Castings



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Largest General Manufacturers of Accessories in the World.

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HOLDERS (Continued)

LICENSE HOLDERS (Continued)

PERKINS Campbell Co., 624 Broadway, Cincinnati, O.
(See page 405.)

PHILLIPS, Fordham (Allston), Boston, Mass. "Boston."

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

STAFFORD Auto Lamp & Number Co., 1475 Michigan Ave., Chicago, Ill.

STANDARD—See Automobile License Indicator Co.

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.
(See page 271.)

OIL CAN HOLDERS

BECCO—See Michigan Motor Specialties Co.

BUFFUM Tool Co., Louisiana, Mo.

DAYTON Malleable Iron Co., Dayton, O.

HALLADAY Co., L. P., Streator, Ill. "Reliable."

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill. "Security."

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco."
(See page 523.)

RELIABLE—See Halladay Co.

SECURITY—See Mayo Mfg. Co.

STARTING CRANK HOLDERS

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

CAMPBELL—See Perkins Campbell Co.

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind.

ECONOMY Stay Co., Jefferson City, Mo.

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

GILBERT Mfg. Co., New Haven, Conn.

GORDON—See Vehicle Apron & Hood Co.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HAWES Storm Front Co., 14 N. Monroe St., Coldwater, Mich.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

HOOVER Co., W. H., New Berlin, O.

NATHAN Novelty Mfg. Co., 90G Reade St., New York, N. Y.
(See page 671.)

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

NORTHERN Specialty Co., Crystal Falls, Mich.

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell."
(See page 405.)

SPECIALTY Harness Co., Dayton, Va.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

SUPERIOR—See Feeser Co.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

TIRE HOLDERS

(For carrying spare tires on cars)

ACME—See Cox Brass Mfg. Co.

ACME—See Garage Equipment Mfg. Co.

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALAMO—See Findeisen & Kropf Mfg. Co.

ALDING—See Alsten & Goulding Co.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Auto Specialty Co., 1926 Broadway, New York, N. Y.
(See page 107.)

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMCO—See Chicago Electric Mfg. Co.

ATLAS—See Garage Equipment Mfg. Co.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 341.)

AUTO Brass Mfg. Co., 56 Friendship St., Providence, R. I.

AUTO Parts Mfg. Co., 171 Michigan St., Milwaukee, Wis. "Badger."

AUTO Specialty Co., 2144 Madison Ave., Toledo, O. "Campbell."

B. & B. Mfg. Co., 6526 Carnegie Ave., Cleveland, O.

BADGER—See Auto Parts Mfg. Co.

BANNER—See Garage Equipment Mfg. Co.

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Monarch."

BUCKEYE—See Central Brass & Fixture Co.

CAMPBELL—See Auto Specialty Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

CLEVELAND Hardware Co., Cleveland, O.

COWLES & Co., C., New Haven, Conn.
(See page 177.)

COX Brass Mfg. Co., Albany, N. Y. "Monarch." "Duplex," "Acme."
(See page 407.)

DAYTON Malleable Iron Co., Dayton, O.

DETLOFF, A. J., 121 Champlain St., Detroit, Mich.

DOUGLAS & Lomason Co., Detroit, Mich.

DUPLEX—See Cox Brass Mfg. Co.

DUPLEX—See Garage Equipment Mfg. Co.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

EBERHARD Mfg. Co., Cleveland, O.
(See page 237.)

EUREKA—See Garage Equipment Mfg. Co.

EXCELSIOR—See Garage Equipment Mfg. Co.

F & K—See Findeisen & Knopf Mfg. Co.

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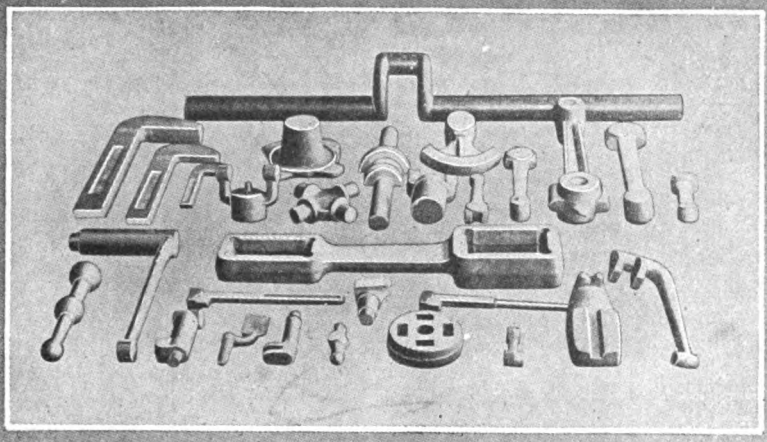
BARNETT DROP FORGING CO.

EAST HAMPTON, MASS.



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HOLDERS (Continued)

TIRE HOLDERS (Continued)

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. "F & K," "Alamo," "Rex."

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Acme," "Banner," "Duplex," "Eureka," "Gemco," "Hercules," "Ideal," "Milwaukee," "Premier," "Simplex," "Standard," "Superior," "Sampson," "Atlas," "Excelsior," "Reliable." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GILBERT Mfg. Co., New Haven, Conn.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn. (See page 343.)

HALLADAY Co., L. P., Streator, Ill. "Reliable."

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HERCULES—See Garage Equipment Mfg. Co.

HERCULES—See Western Brass Mfg. Wks.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IDEAL—See Garage Equipment Mfg. Co.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

MASCO—See Milwaukee Auto Specialty Co.

MEDINA Stamping & Machine Co., Medina, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILWAUKEE—See Garage Equipment Mfg. Co.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium," "Masco." (See page 507.)

MONARCH—See Beckley-Ralston Co.

MONARCH—See Cox Brass Mfg. Co.

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PREMIER—See Garage Equipment Mfg. Co.

RADIUM—See Milwaukee Auto Specialty Co.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

RELIABLE—See Garage Equipment Mfg. Co.

RELIABLE—See Halladay Co.

REX—See Findeisen & Knopf Mfg. Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J.

SAMPSON—See Garage Equipment Mfg. Co.

SIMPLEX—See Garage Equipment Mfg. Co.

SJOHOLM, N. P., 11 Westmoreland Pl., St. Louis, Mo.

SLY Mfg. Co., W. W., Cleveland, O.

SMITH Co., H. Lund, 201 Paterson Ave., Paterson, N. J.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

STANDARD—See Garage Equipment Mfg. Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

SUNDERLAND Mfg. Co., 1220 S. Michigan Ave., Chicago, Ill.

SUPERIOR—See Garage Equipment Mfg. Co.

TOFFLER Co., S., 341 E. 136th St., New York, N. Y.

UNIVERSAL—See New York Coach & Auto Lamp Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. "Hercules." (See page 97.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J. (See page 271.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WATCH HOLDERS

(See also Clocks, Dashboard)

ADAMS Co., Henry T., 6823 S. Chicago Ave., Chicago, Ill. "Quick Action."

ANCHOR—See Metal Specialties Mfg. Co.

CALDWELL & Co., H. S., 74 Cortlandt St., New York, N. Y. "Readwell."

COWLES & Co., C., New Haven, Conn. (See page 177.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

GOODWIN & Kintz Co., Winsted, Conn.

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Anchor."

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

QUICK ACTION—See Adams Co.

READWELL—See Caldwell & Co.

SIMPLEX—See Sterling Mfg. Co.

STERLING Mfg. Co., Staunton, Va. "Simplex."

HOODS

MOTOR HOODS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 333.)

BRISCOE Mfg. Co., Detroit, Mich.

BRISKIN-WOLSIEFER Mfg. Co., 541 N. Capitol Ave., Indianapolis, Ind.

BUNN-HUTCHINSON Co., 330 Prospect Ave., N. W., Cleveland, O.

BUSH Mfg. Co., Hartford, Conn. (See page 225.)

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

EUREKA Auto Parts Mfg. Co., 3029 Olive St., St. Louis, Mo.

FORSYTH Bros. Co., Harvey, Ill.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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Sixty-Two Different Manufacturers

are now specifying Long cooling systems.

We have been able to furnish them with the system they needed and wanted.

Our modern factory with its efficient crimping, punching, bending and stamping machinery makes our product *uniformly good.*

We make all kinds of cooling systems—cellular, honey-comb, spiral tube types for all kinds of cars, trucks and tractors.

Also hoods, radiator and accessory fittings.

We guarantee to solve your cooling problems.

Let our Engineering Department help you.

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LONG MANUFACTURING CO., Detroit, Mich.

The Index to Quality Cars

BUSH MANUFACTURING CO
HARTFORD CONN.

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HOODS (Continued)

MOTOR HOODS (Continued)

HARTFORD Sheet Metal Works, 325 N. Front St., Hartford, Conn.

HAYES-IONIA Co., Ionia, Mich.

HAYES Mfg. Co., Detroit, Mich. (See pages 78 and 79.)

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y. (See page 213.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O. "Kinwood." (See page 153.)

KINWOOD—See Kinsey Mfg. Co.

LONG MFG. Co., Detroit, Mich. (See page 225.)

MAYO Radiator Co., New Haven, Conn.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Pressed Steel Co. (E. Moline), Moline, Ill.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

PARAGON Auto Parts Mfg. Co., 506 W. 53d St., New York, N. Y.

PERFEX Radiator Co., Racine, Wis.

REID Co., 1603 Second Ave., Moline, Ill.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SPRINGFIELD Metal Body Co., Springfield, Mass. (See page 140.)

SUSSMAN & Rosenberg Mfg. Co., M., Tarrytown, N. Y.

TODD Mfg. Co., 820-24 Mary Pl., Minneapolis, Minn.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

WRIGHT Cooler & Hood Mfg. Co., Muskegon, Mich.

HOOKS

SNAP HOOKS

ANCHOR—See North & Judd Mfg. Co.

COVERT Mfg. Co., Troy, N. Y.

FRAZER & Jones Co., Syracuse, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NORTH & Judd Mfg. Co., New Britain, Conn. "Anchor."

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.) (See page 271.)

WIENER-BARNET Co., 812-22 Adams St., Newark, N. J.

WILCOX, Crittenden & Co., 83 Main St., Middletown, Conn.

HORNS

BULB HORNS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Maxim."

DEAN Electric Co., 2515 Taylor St., Elyria, O. "Tally-O." (See page 138.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

MAXIM—See Automobile Supply Mfg. Co.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y.

NOVELCO—See Novelty Mfg. Co.

NOVELTY Mfg. Co., Waterbury, Conn. "Novelco." (See page 495.)

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn. (See page 331.)

POST & Lester Co., Hartford Conn. (Importers.) "Volier." (See page 297.)

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

SAXON Mfg. Co., 205-19 Cherry St., Toledo, O.

STANDARD Metal Mfg. Co., Newark, N. J. (See page 227.)

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

TALLY-O—See Dean Electric Co.

VOLIER—See Post & Lester Co.

ELECTRIC HORNS AND HORN BLOWERS

ADAMS-BAGNALL Electric Co., Cleveland, O. (See page 243.)

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y. "Jaco."

AMERICAN Brass Products Co., Hartford, Ct. "Matchless."

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill. "Samson."

ATWATER Kent Mfg. Works, 4937 Stenton Ave., Philadelphia, Pa. "Monoplex."

AUTO PHONE—See Hipwell Mfg. Co.

AUTOBIS—See Holtzer-Cabot Electric Co.

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Newtone," "Electra."

CLERO—See Fitzgerald Mfg. Co.

DEAN Auto Devices Co., 120 S. Sangamon St., Chicago, Ill. "Fordorn."

DEAN Electric Co., 2515 Taylor St., Elyria, O. "Tuto," "Tutoette," "Rexo." (See page 138.)

DIXIE—See Edwards & Co.

DUPLEX Electric Mfg. Co., Pittsburg, Pa.

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y. "Dixie."

ELECTRA—See Automobile Supply Mfg. Co.

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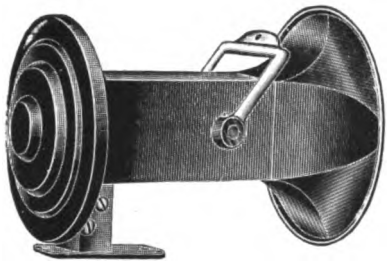

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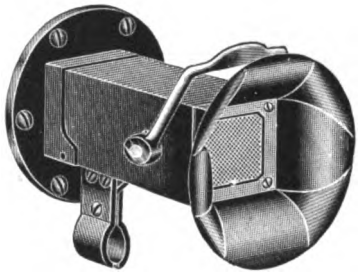
Mechanical horn for Automobiles and Motor Boats

Requires no batteries, wires or bulbs. Will positively not be affected by dust, oil or water. The tone is abrupt, deep and penetrating, and may be regulated as desired. Can be operated from any part of the car, and is guaranteed absolutely dependable. Price $12.00. Finished in Black Enamel, Black and Nickel, and Black and Brass.

RELIANCE JUNIOR

For Motorcycles and small motor cars

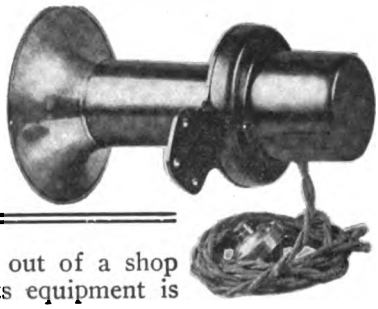
Designed and operated the same as the Reliance. Finished in Black Enamel. Price $8.00.



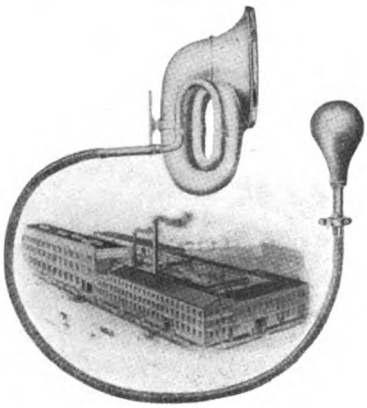
Manufactured by

Culmer Engineering Company, Inc.
6 Church Street, New York City

STANDARD HORNS



The best designed car that ever came out of a shop is not complete unless every detail of its equipment is of the best.



A horn of "STANDARD" quality denotes a horn of superior service.

We manufacture a more complete line of BULB and ELECTRIC HORNS than any other concern in the United States.

Our big, handsome, musical tone signals are unexcelled in design, material and workmanship.

Write for prices and complete information.

Send for our catalog.

Standard Metal Mfg. Co.
NEWARK, NEW JERSEY

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HORNS (Continued)

ELECTRIC HORNS AND HORN BLOWERS (Continued)

ELECTRIC Horn & Specialty Co., 119 Columbia St., Utica, N. Y. "Oneita."

ELECTRIC Spark Appliance Co., 140-62 Imlay St., Brooklyn, N. Y. "Olympic."

FITZGERALD Mfg. Co., Torrington, Conn. "Clero."
(See page 231.)

FORDORN—See Dean Auto Devices Co.

FRANKFORT—See Utica Steam Gauge Co.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HI-LO—See Premier Electric Co.

HIPWELL Mfg. Co., 831-35 North Ave., W., Pittsburg, Pa. "Auto Phone."
(See page 231.)

HOLTZER-CABOT Electric Co., Brookline, Mass. "Autobis," "Reacto."
(See page 231.)

JACO—See Alexander Mfg. Co.

KA-HA-CO—See Kales-Haskel Co.

KALES-HASKEL Co., 441-53 Lafayete Blvd., Detroit, Mich. "Ka-Ha-Co."

KLAXET—See Lovell-McConnell Mfg. Co.

KLAXON—See Lovell-McConnell Mfg. Co.

KLAXONET—See Lovell-McConnell Mfg. Co.

LOVELL-McCONNELL Mfg. Co., Newark, N. J. "Klaxon," "Klaxonet," "Klaxet."
(See page 231.)

MANHATTAN Electrical Supply Co., New York, N. Y.
(See page 533.)

MATCHLESS—See American Brass Products Co.

MAXEFF Electric Horn Co., 814 Woodward Ave., Detroit, Mich.

MONOPLEX—See Atwater Kent Mfg. Works.

NEWTONE—See Automobile Supply Mfg. Co.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y.

O'BRIEN Electrophone Co., Hallowell, Me.

OLYMPIC—See Electric Spark Appliance Co.

ONEITA—See Electric Horn & Specialty Co.

PREMIER Electric Co., 4032-42 W. Ravenswood Ave., Chicago, Ill. "Hi-Lo," "Repello."

REACTO—See Holtzer-Cabot Electric Co.

RAPID FIRE—See Russell Electric Co.

REPELLO—See Premier Electric Co.

REXO—See Dean Electric Co.

RUSSELL Electric Co., Danbury, Conn. "Saxon," "Rapid Fire," "Saxonette."

SAMSON—See American Electric Co.

SAXON—See Russell Electric Co.

SAXON Mfg. Co., 205-19 Cherry St., Toledo, O.

SAXONETTE—See Russell Electric Co.

SIRENO Co., 18-20 Rose St., New York, N. Y.

SPARKS-WITHINGTON Co., Jackson, Mich. "Sparton."
(See page 175.)

SPARTON—See Sparks-Withington Co.

SQUARE Motor Horn Co., 312-28 Adams St., Newark, N. J.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 227.)

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

TUTO—See Dean Electric Co.

TUTOETTE—See Dean Electric Co.

TYPHOON Signal Co., Gibbons Bldg., Chicago, Ill.

UTICA Steam Gauge Co., Frankfort, N. Y. "Frankfort."

WARNER Electric Co., Walnut & 20th Sts., Muncie, Ind.

EXHAUST HORNS

(Tube Horns or Chimes and Whistles)

AERMORE—See Fulton Co.

AHCO—See Arnold-Hough Co.

AMCO—See Chicago Electric Mfg. Co.

APCO—See Auto Parts Co.

ARNOLD-HOUGH Co., 124 Washington St., Providence, R. I. "Ahco."

AUTO Equipment Mfg. Co., 18 Pearl St., Newton, Mass.

AUTO Parts Co., 50 Exchange Pl., Providence, R. I. "Apco."

AUTOCHIME—See Gray-Hawley Mfg. Co.

AUTOLARM—See Gray-Hawley Mfg. Co.

BARCO Brass & Joint Co., 226-30 N. Jefferson St., Chicago, Ill.

BIG Four Horn Co., Watseka, Ill.

BLAZER—See Motor Specialties Co.

BONNER Co., D. Henry, 96 Plymton St., Cambridge, Mass. "Tremo."

BUELL Auto Co., 6053 Cottage Grove Ave., Chicago, Ill.

CAMPBELL Mfg. Co., 3715 Wentworth Ave., Chicago, Ill. "Harkaway."

CHICAGO Electric Mfg. Co., 523-29 Van Buren St., Chicago, Ill. "Amco."

CLIMAX Electric Works, New Salem, Mass.

COMING Mfg. Co., Railway Exchange Bldg., Chicago, Ill. "Trinity."

DAVIES-BACH Mfg. Co., Davies Bldg., Alliance, O. "Right O'Way."

EMPIRE—See S. B. R. Specialty Co.

EXO—See Troy Auto Specialty Co.

F & K—See Findeisen & Kropf Mfg. Co.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. "Husk," "F & K," "Jumbo Husk."

FOGG—See Motor Specialties Co.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill. "Howler."

FULTON Co., Marshalltown, Ia. "Aermore."

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Melody," "Superior."
(See page 221.)

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich. "Autochime," "Autolarm."

HARKAWAY—See Campbell Mfg. Co.

HOWLER—See Fowler Lamp & Mfg. Co.

HUSK—See Findeisen & Kropf Mfg. Co.

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Known Widely and Well Throughout the Whole Motoring World

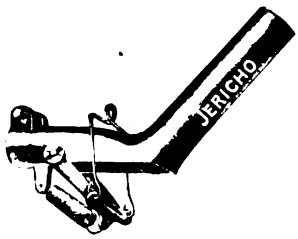
RANDALL-FAICHNEY

Automobile Accessories

Jericho Horn—"The horn that says 'Please.' "

Popular because of its pleasing but penetrating tone, gently insistent when crawling through a crowd, loud enough to be heard far 'round a curve when speeding on country roads.

Can't clog or otherwise give trouble, no expense for upkeep. Blown by exhaust and operated by pedal beneath heel.

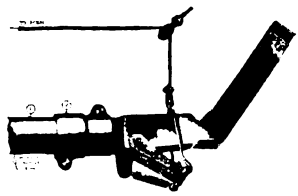


Special Jericho Model for Fords—No. 00 Jericho, "Wins the Right of Way." No trouble to attach, no expense to operate. A horn that will not clog or choke. Always dependable and will last as long as the car.

Jubilee Horn—"The horn that warns without offense."

Sometimes called the Jubilee Jericho. Same type of exhaust horn as the Jericho, but instead of a single note it sounds a beautiful, mellow chime of deep and resounding tone.

Attached in the same way and with the same fittings as the Jericho.



B-Line Guns—"The handy devices for unhandy places."

This famous line of all-metal, non-leakable, oil-grease guns are so perfectly ground and fitted that they may safely be used as oil carriers.

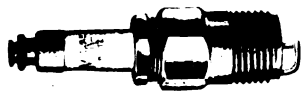
Handle gasoline, light oil, heavy oil, non-fluid oil, or heaviest grease. Furnished with a variety of tips which reach any point in the car.

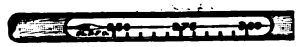
MacKae Blitz Spark Plugs

Have electrodes wound with sheet mica, encased in porcelain especially annealed to prevent undue brittleness.

The porcelain prevents the mica from fouling. The mica affords working insulation should a porcelain break.

Firing points are annealed with special platinum alloy to prevent fusing or carbonizing.





"Ranfac" Vulcanizing Thermometer

Our line of thermometers is remarkably complete, and every one is accurate to the smallest fraction of a degree. We guarantee perfect precision. Every shape, size and style of vulcanizing thermometer furnished to fit your requirements either from stock or to special order.

Note the brief descriptions above, representing only in part our splendid lines of high grade automobile accessories. Write for complete catalog, together with prices, terms and full particulars.

THE RANDALL-FAICHNEY CO., Boston, U.S.A.

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HORNS (Continued)

EXHAUST HORNS (Continued)

INTERNATIONAL Automobile Supply Co., 117 W. South Water St., Chicago, Ill. "Victor."
(See page 585.)

JERICHO—See Randall-Faichney Co.

JOEY-MELL—See Loose Mixing Chamber Co.

JUBILEE—See Randall-Faichney Co.

JUMBO HUSK—See Findeisen & Kropf Mfg. Co.

LEE Tire & Rubber Co., Conshohocken, Pa. "Waymaker."

LOOSE Mixing Chamber Co., R. D., 110½ N. Fifth St., Springfield, Ill. "Joey-Mell."

MELODY—See Garage Equipment Mfg. Co.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium Angelus."
(See page 507.)

MINERVA Hardware Mfg. Co., Minerva, O.

MOTOR Specialties Co., Waltham, Mass. "Blazer," "Fogg."

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo.
(See page 355.)

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

NIGHTINGALE—See Riley-Klotz Mfg. Co.

RADIUM ANGELUS—See Milwaukee Auto Specialty Co.

RANDALL-FAICHNEY Co., Boston, Mass. "Jericho," "Jubilee."
(See page 229.)

RED DEVIL—See Standard Motor Parts Mfg. Co.

RIGHT O'WAY—See Davies-Bach Mfg. Co.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J. "Nightingale."

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Empire."

SCREAM Sales Co., 2724 Michigan Ave., Chicago, Ill.

STANDARD Motor Parts Mfg. Co., 1200 Chestnut St., Philadelphia, Pa. "Red Devil."

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

SUPERIOR—See Garage Equipment Mfg. Co.

TREMO—See Bonner Co.

TRINITY—See Coming Mfg. Co.

TROY Auto Specialty Co., Troy, N. Y. "Exo."

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR—See International Automobile Supply Co.

WAYMAKER—See Lee Tire & Rubber Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

MECHANICAL HORNS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Motophone."

CULMER Engineering Co., 6 Church St., New York, N. Y. "Reliance."
(See page 227.)

KLAXON—See Lovell-McConnell Mfg. Co.

LOVELL-McCONNELL Mfg. Co., Newark, N. J. "Klaxon."
(See page 231.)

M-L—See Miller-Lovatt Co.

MILLER-LOVATT Co., Weatherly, Pa. "M-L."

MOTOPHONE—See Automobile Supply Mfg. Co.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y. "Pilot."

PIEL Co., G., 13th St. & Boulevard, Long Island City, N. Y.

PILOT—See Nonpareil Horn Mfg. Co.

RELIANCE—See Culmer Engineering Co.

SPARKS-WITHINGTON Co., Jackson, Mich. "Sparton-Echo."
(See page 175.)

SPARTON-ECHO—See Sparks-Withington Co.

TALKING Horn Co., Middletown, N. Y.

SIREN HORNS

O'BRIEN Electrophone Co., Hallowell, Me.

SIRENO Co., 18-20 Rose St., New York, N. Y.

STERLING Machine Co., Norwich, Conn. "Uncas."

UNCAS—See Sterling Machine Co.

HOSE

RUBBER HOSE

ACME Rubber Mfg. Co., Trenton, N. J.

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 585.)

CLEVELAND—See Mechanical Rubber Co.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa.
(See page 419.)

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

GOODRICH Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HIDE, Leather & Belting Co., Indianapolis, Ind.
(See page 251.)

HOME Tire Co., Trenton, N. J.
(See page 419.)

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MATTSON Rubber Co., Lodi, N. J.
(See page 419.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O. "Cleveland."

MERCER Rubber Co., Hamilton Square, N. J.

MILFORD Rubber Works, Milford, Ill.

MINERALIZED Rubber Co., 165 Chambers St., New York, N. Y.

NATIONAL India Rubber Co., Bristol, R. I.

Complete Index to Classification appears on Pages 8 to 22.

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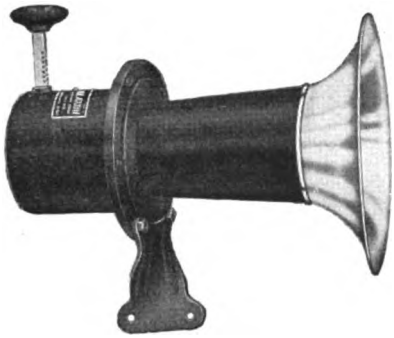

The Hand Klaxon, $10

The Hand Klaxon is a development of the original Hand Klaxon manufactured in 1909. It is in every particular a Klaxon. It has the true Klaxon note. It is sold under the regular Klaxon guarantee of permanent satisfaction. The Hand Klaxon is designed particularly for cars not equipped with batteries. It is complete in itself—no outside power is necessary.

LOVELL-McCONNELL MFG. COMPANY
Makers of the "KLAXON" Newark, N. J.

The Clero Ford Magneto Horn

This live accessory is designed to run on the magneto of a Ford car. As it does not require dry batteries, it has no up-keep expense, and as it has no wearing parts it will last forever.

It is the most efficient, reliable and the loudest horn manufactured today.

Retail price, including wiring and push button, $4.00.

Finished in: Black and Nickel
Black and Brass
All Black.

Manufactured By
The Fitzgerald Mfg. Co. Torrington, Conn.

HIPWELL MFG. CO.

MANUFACTURERS OF

ELECTRIC HORNS
ELECTRIC LIGHT OUTFITS
GREASE GUNS
VULCANIZERS
MFRS. OF SPECIALTIES

831,833,835 North Ave. West, Pittsburg, Penn.

Send For Booklet 851 J

The horn you will want when you hear it.

THE REACTO

INSISTENT BUT NOT INSULTING

The tone is clear, deep, powerful, pleasing—not a screech nor a squawk.

The Holtzer-Cabot Elec. Co.

CHICAGO, ILL. BROOKLINE, MASS.

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HOSE (Continued)

RUBBER HOSE (Continued)

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

NEW York Rubber Co., 84 Reade St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O.

THERMOID Rubber Co., Trenton, N. J.
(See page 499.)

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J.
(See page 371.)

WHITEHEAD Bros. Rubber Co., Trenton, N. J.

WOVEN Steel Hose & Rubber Co., Trenton, N. J.
(See page 63.)

HOUSINGS

PRESSED STEEL AXLE HOUSINGS

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 233.)

CROSBY Co., Buffalo, N. Y.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 233.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

SMITH Co., A. O., Milwaukee, Wis.
(See page 387.)

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 169.)

HUBS

WHEEL HUBS

AMERICAN Ball-Bearing Co., Cleveland, O.
(See page 57.)

DAVIES-BACH Mfg. Co., Davies Bldg., Alliance, O.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 233.)

GREENVILLE Metal Products Co., Greenville, Pa.

IMPERIAL-MOTT Department, Flint, Mich.
(See page 351.)

JACKSON Drop Forging Co., Jackson, Mich.

KELSEY Wheel Co., Detroit, Mich.

METAL Products Co., Detroit, Mich.
(See page 537.)

MOTT Wheel Works, Utica, N. Y.
(See page 349.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 363.)

SPARKS - WITHINGTON Co., Jackson, Mich.
(See page 175.)

TIMKEN-DETROIT Axle Co., Detroit, Mich.

WALKER-WEISS Axle Co., Flint, Mich.

WESTON-MOTT Co., Flint, Mich.
(See page 209.)

HYDROMETERS

TESTING HYDROMETERS

(For testing Battery Electrolyte, Gasoline, etc.)

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

FREEZOMETER—See Taylor Instrument Cos.

GENERAL Scientific Equipment Co., 2000 Market St., Philadelphia, Pa.

QUEEN-GRAY Co., 616-18 Chestnut St., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., 481 De Kalb Ave., Brooklyn, N. Y.

SIMPLEX Hydrometer Co., Newark, N. J.

STORAGE Battery Supply Co., 239 E. 27th St., New York, N. Y.

TAGLIABUE Mfg. Co., C. J., Bush Terminal Bldg., Brooklyn, N. Y.

TAYLOR Instrument Cos., 95 Ames St., Rochester, N. Y. "Freezometer."

INDICATORS

AUTOMOBILE SPEED INDICATORS

(See Speedometers)

DISTANCE OR MILEAGE INDICATORS

(See Meters, Distance)

GRADE INDICATORS

(See Meters, Grade)

SPARK INDICATORS

(See Gaps, Spark)

TAIL LIGHT INDICATORS

(Device to show when tail light goes out.)

BOSTON—See Harding Specialties Co.

CAMPBELL Mfg. Co., 3715 Wentworth Ave., Chicago, Ill. "Tell-Tale."

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This Company manufactures
more real Pressed Steel

TRUCK FRAMES

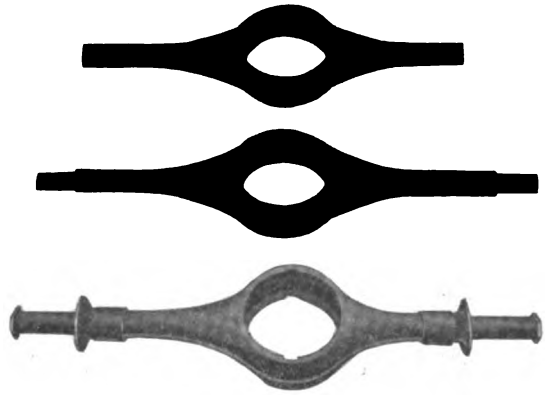
of special design than all other makers combined—because our product is known to be

INTERCHANGEABLE

and is an Asset of every
car of which it forms a part

Detroit Pressed Steel Company
1800 Mt. Elliott Ave. :: :: Detroit, Michigan

PRESSED STEEL AXLE HOUSINGS



Perfectly Welded, Straightened and Accurate to Dimensions.

PRESENT CAPACITY 500 PER DAY

THE BOSSERT COMPANY Utica, N. Y.

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INDICATORS (Continued)

TAIL LIGHT INDICATORS (Continued)

GUARANTEED Specialties Co., Kinney Bldg., Newark, N. J.

HARDING Specialties Co., 755 Boylston St., Boston, Mass. "Boston."

TELL-TALE—See Campbell Mfg. Co.

INFLATORS

TIRE INFLATORS

(See Pumps; also Tanks)

INJECTORS

BOILER FEEDING INJECTORS

AMERICAN Injector Co., 173 14th Ave., Detroit, Mich.

PENBERTHY Injector Co., Detroit, Mich.

GREASE INJECTORS

(See Guns, Grease)

INSTRUMENTS

GAS ANALYSIS INSTRUMENTS

COAPCO—See Combustion Appliances Co.

COMBUSTION Appliances Co., 1775 Lunt Ave., Chicago, Ill. "Coapco."

GEAR TESTING INSTRUMENTS

FEICHT-BEVINGTON Mfg. Co., Cleveland, O.
(See page 517.)

MOTOR TESTING INSTRUMENTS

(For locating knocks in motors)

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill. "Sonoscope."

BOSTON Talking Machine Co., Ames & Amherst Sts., Cambridge, Mass. "Detectorphone."

DETECTORPHONE—See Boston Talking Machine Co.

HOPEWELL Bros., Newton, Mass. "Vibracator."
(See page 671.)

PILLING & Son Co., G. P., Arch & 23d Sts., Philadelphia, Pa. "Phonendoscope."

PHONENDOSCOPE—See Pilling & Son Co.

SONOSCOPE—See American Electric Co.

T. A. D.—See Toledo Auto Devices Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

VIBRACATOR—See Hopewell Bros.

RUBBER TESTING INSTRUMENTS

SHORE Instrument & Mfg. Co., 555-57 W. 22d St., New York, N. Y.

STEEL TESTING INSTRUMENTS

SCLEROSCOPE—See Shore Instrument & Mfg. Co.

SHORE Instrument & Mfg. Co., 555-57 W. 22d St., New York, N. Y. "Scleroscope."

INTENSIFIERS

SPARK INTENSIFIERS

(See Gaps, Spark)

IRONS

BODY OR TOP IRONS

ASHTABULA Bow Socket Co., Ashtabula, O.

BLAKESLEE Forging Co., Plantsville, Conn.

CLEVELAND Hardware Co., Cleveland, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y.

COWLES & Co., C., New Haven, Conn.
(See page 177.)

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 379.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

GENERAL Drop Forge Co., 1740 Elmwood Ave., Buffalo, N. Y.
(See page 187.)

MICHIGAN Bolt & Nut Works, ft. Meldrum Ave., Detroit, Mich.

NEWTON & Son, W. H., 125 Elm St., Cortland, N. Y.

RANDS Mfg. Co., 67-89 Fort St., E., Detroit, Mich.

SCHERER & Co., H., Detroit, Mich.

SLAT IRONS

(For Bow Sockets—See Sockets, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

COWLES & Co., C., New Haven, Conn.
(See page 177.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

TIRE IRONS

(See Tools, Tire)

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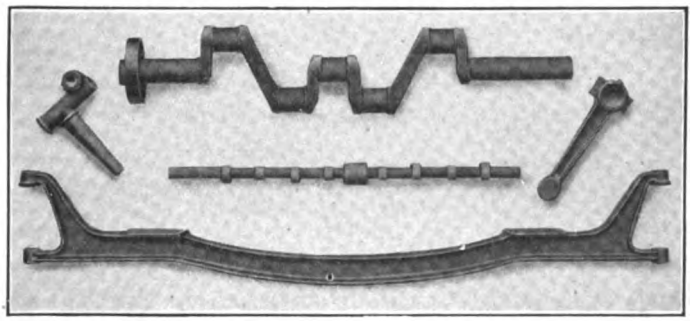
GOOD GEARS

For Automobiles

Frost Gear & Machine Co.
Jackson, Michigan
(The Auto. Parts Town)

DROP FORGINGS



Open Hearth, Nickel, Vanadium, and all Alloy Steels.

HEAT Treating
A Specialty

AXLES, CRANKSHAFTS, CAMSHAFTS, FORGINGS FOR GAS ENGINES. Special Forgings of all Descriptions. Send Blue Prints for Estimates.

BAKER DROP FORGE COMPANY
JACKSON, MICHIGAN

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JACKS

LIFTING JACKS

A. B. C.—See Motor Specialties Co.

AJAX—See Lennox Jack Works.

ALRITE—See National Jack & Mfg. Co.

ASHLAND Mfg. Co., Second St., Ashland, O. "Eureka," "Atlas," "Speeder."

ATLAS—See Ashland Mfg. Co.

BADGER—See Walker-Moore Mfg. Co.

BARRETT—See Duff Mfg. Co.

BARTH Mfg. Co., 74 L St., Milwaukee, Wis.
(See page 237.)

BATAVIA Clamp Co., 131 Center St., Batavia, N. Y. "Colts."

BUCKEYE Jack Mfg. Co., Alliance, O.

BUDA Co., Harvey, Ill.
(See page 377.)

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHICAGO Jack & Supply Co., 175 W. Jackson Blvd., Chicago, Ill.

COLTS—See Batavia Clamp Co.

DUFF Mfg. Co., Preble Ave., Pittsburg, (N. S.), Pa. "Barrett."

ELITE Mfg. Co., Ashland, O. "Reliable."

EUREKA—See Ashland Mfg. Co.

GIANT—See S. B. R. Specialty Co.

HANSON, Henry L., 25 Union St., Worcester, Mass.

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J.
(See page 367.)

HERCULES—See Western Brass Mfg. Works.

JOYCE-CRIDLAND Co., 329 S. Linden Ave., Dayton, O. "XX Century."

KAZOO—See National-Standard Co.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O. "Ajax."

LITTLE GIANT—See National Jack & Mfg. Co.

LITTLE GIANT—See Pratt Mfg. Co.

MOTOR Specialties Co., Waltham, Mass. "A. B. C."

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill. "Alrite," "Little Giant," "Starite."

NATIONAL-STANDARD Co., Niles, Mich. "Kazoo," "Standard."
(See page 237.)

NEW SAMPSON—See Oliver Mfg. Co.

OLIVER Mfg. Co., 326 S. Desplaines St., Chicago, Ill. "Peerless," "New Sampson."

PEERLESS—See Oliver Mfg. Co.

PERFECT—See Walker-Moore Mfg. Co.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill. "Little Giant," "Pup."

PUP—See Pratt Mfg. Co.

RACINE Auto Parts Co., 16th St. & Junction Ave., Racine, Wis. "Rapco."

RAPCO—See Racine Auto Parts Co.

RELIABLE—See Elite Mfg. Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Giant."

SHAWVER Co., rear 31 W. Pleasant St. Springfield, O. "Springfield."

SPEEDER—See Ashland Mfg. Co.

SPRINGFIELD—See Shawver Co.

STANDARD—See National-Standard Co.

STARITE—See National Jack & Mfg. Co.

TRIUMPH—See Walker-Moore Mfg. Co.

VAN—See Vanderpool Co.

VANDERPOOL Co., 723 W. Mulberry St., Springfield, O. "Van."

WALKER-MOORE Mfg. Co., 310 Walker St., Racine, Wis. "Badger," "Triumph," "Perfect."

WERNER-SERVICE Mfg. Co., 263 Fairmount Ave., Jersey City, N. J.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. "Hercules."
(See page 97.)

XX CENTURY—See Joyce-Cridland Co.

SPECIAL JACKS

(Wheeled, Two and Four Wheel Lifting, Etc.)

ADAMS Jack Co. of America, H. W. Hellman Bldg., Los Angeles, Cal.

AMES Mfg. Co., Franklin, Pa.

BECKERT & Son, William, 1001 E. Ohio St., N. S., Pittsburg, Pa.

BURROUGHS Lift & Truck Co., Racine, Wis

CANTON Foundry & Machine Co., Canton, O. "Universal."
(See page 479.)

EXCEL Jack Mfg. Co., 27 Lansdowne St., Boston, Mass.

READING Automobile Co., 126-28 N. Fifth St., Reading, Pa.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y.

UNIVERSAL—See Canton Foundry & Machine Co.

WEAVER Mfg. Co., Springfield, Ill.

TIRE SAVING JACKS

(For holding car off the floor when not in use)

ASHLAND Mfg. Co., Second St., Ashland, O. "Eureka."

AUTO Jack Works, 300-08 Michigan St., La Grange, Ind. "Detroit."

AUTOMATIC Tire Rest Co., 304-06 E. 15th St., Kansas City, Mo.

BEARD Auto Lift Co., Pleasant Lake, Ind.

BICYCLE Step Ladder Co., 6 W. Randolph St., Chicago, Ill.

BREYER Bros., Whiting & Co., Waupun, Wis. "New Century."

CADY Auto-Jack Co., Rockefeller Bldg., Cleveland, O.

CANNON, W. B., Park St. & Kalamazoo Ave., Vicksburg, Mich.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

DAYTON Malleable Iron Co., Dayton, O.

DETROIT—See Auto Jack Works.

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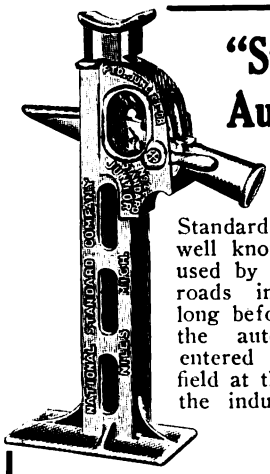


"Standard" Automobile Jacks

Standard jacks were well known and widely used by the largest railroads in the country long before the days of the automobile. They entered the automobile field at the beginning of the industry and have kept steady pace with its development.

They are reliable. They always work right. They are constructed up to the standard of the very highest grade cars. Many of the largest and most prominent car makers are today using them as standard equipment. Our facilities are large enough to meet any demand. Send today for our new catalog, showing complete line.

National-Standard Company
Niles, Mich.
Successors to
Cooks Standard Tool Co.
Kalamazoo, Mich.

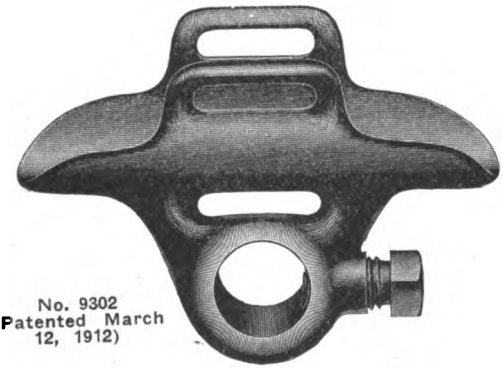
No. 9330

EMCO

MALLEABLE IRON HARDWARE FOR AUTOMOBILES

No. 9311

ACCELERATORS
BOW RESTS
CUT OUTS
BOW SEPARATORS
HINGES
HOOD FASTENERS
JACKS



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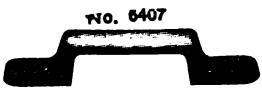
(Patented March 12, 1912)

LAMP BRACKETS
SPRING SHACKLES
RAIL BRACKETS
LEVERS
TIRE HOLDERS
TOE RAIL BRACKETS
TURNBUCKLES

No. 9315

No. 5407



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THE EBERHARD MFG. CO.
CLEVELAND, OHIO

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JACKS (Continued)

TIRE SAVING JACKS (Continued)

EBERHARD Mfg Co., Cleveland, O. "Emco."
(See page 237.)

ELITE Mfg. Co., Ashland, O. "Reliable."

EMCO—See Eberhard Mfg. Co.

EUREKA—See Ashland Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 221.)

GARLICK Auto Jack & Prop Co., 250 12th Ave., Paterson, N. J.

HART, C. A., 520 N. Main St., Findlay, O.

HASLUP Motor Jack Co., Sidney, O.

HOCO—See Hoeft & Co.

HOEFT & Co., Ashland Ave. & Kinzie St., Chicago, Ill. "Hoco."

JIFFY JAX—See Lennox Jack Works.

JUSTRITE—See National Jack & Mfg. Co.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O. "Jiffy Jax."

MOORE—See Walker-Moore Mfg. Co.

MORGAN, B., John St., Newport, R. I.

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill. "Justrite."

NEW CENTURY—See Breyer Bros., Whiting & Co.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill.

RACINE—See Walker-Moore Mfg. Co.

RACINE Auto Parts Co., 16th St. & Junction Ave., Racine, Wis. "Rapco."

RAPCO—See Racine Auto Parts Co.

RELIABLE—See Elite Mfg. Co.

SEDGWICK Mfg. Co., Third & Chestnut Sts., Richmond, Ind.

WALKER-MOORE Mfg. Co., 310 Walker St., Racine, Wis. "Moore," "Racine."

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

JARS

RUBBER BATTERY JARS

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y. "Volcan," "Mercury."

DIAMOND Rubber Co., Akron, O.

LUZERNE Rubber Co., Trenton, N. J.

MERCURY—See American Hard Rubber Co.

STOKES Rubber Co., Jos., Trenton, N. J.

VOLCAN—See American Hard Rubber Co.

JIGS

SPEEDOMETER GEAR CENTERING JIGS

WEBER Cycle & Supply Co., 6 E. Kiowa St., Colorado Springs, Colo.

JOBBERS

SUPPLY JOBBERS

(This is a list of Jobbers and Dealers in Automobile Supplies who advertise in this publication)

POST & Lester Co., Hartford, Conn.
(See page 297.)

PRUDEN Hardware Co., W. E., 864-66 Eighth Ave., New York, N. Y.
(See page 607.)

U. S. Auto Supply Co., 182 Grand River Ave., Detroit, Mich.
(See page 405.)

WASHINGTON Automobile Supply Co., Washington, Ill.
(See page 671.)

ZINKE Co., 1256 Michigan Ave., Chicago, Ill.
(See page 373.)

JOINTS

BALL JOINTS

(For spark and throttle connections)

BILLINGS & Spencer Co., Hartford, Conn.

BIRCHWOOD, C. W., Jacksonville, Fla.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. "Security."
(See pages 239 and 355.)

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 151.)

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

MECHANICAL & Electrical Mfg. Co., 2227 Prairie Ave., Chicago, Ill. "Memco."
(See page 239.)

MEMCO—See Mechanical & Electrical Mfg. Co.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

PERFECTION—See Porter & Co.

PORTER & Co., W. S., 608 S. Dearborn St., Chicago, Ill. "Perfection."

SECURITY—See Chicago Screw Co.

UNIVERSAL JOINTS

ACME Universal Joint Mfg. Co., Stockbridge Ave. & Fulford St., Kalamazoo, Mich.

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind.
(See page 135.)

BAUSH Machine Tool Co., 500 Wason Ave., Springfield, Mass.

BLOOD Bros., Machine Co., Ransom St. & S. Haven R. R., Kalamazoo, Mich.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 211.)

COOPER Machine Works, Eighth Ave. & 18th St., Brooklyn, N. Y.

EVANS—See Merchant & Evans Co.

FRANCKE—See Smith-Serrell Co.

HARTFORD Auto Parts Co., Hartford, Conn.
(See page 137.)

Complete Index to Classification appears on Pages 8 to 22.

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"SECURITY" BALL JOINTS

Not too tight nor too loose—Always in proper adjustment—No Cotter Pins to lose—No Screws to come out—Easily put in place—Impossible to come apart—Ball Head in line with rod—Firm Joint—No Rattle—

THE CHICAGO SCREW CO.
Homan Ave. & Fillmore St., Chicago

ASHTON PRESSURE GAGES

of a superior and dependable quality made in all styles for every kind of service

Also a full line of high grade

SAFETY and RELIEF VALVES

THE ASHTON VALVE CO.

271 Franklin Street **BOSTON, MASS.**

UNIVERSAL JOINTS

K.B. CO. — KANT BUST

BEST FOR

Commercial Cars AND Pleasure Vehicles

Made from the finest Drop Forgings, especially case-hardened throughout. Our Universal Joints have no equal for Quality, Design, High Finish, and Skilled Workmanship.

We guarantee deliveries to commence within two or three weeks from receipt of specifications.

Write us for our catalog and get our prices

MADE IN
— HARTFORD, CONN. —
BY

THE KINSLER-BENNETT CO.
69 Vernon Street
WESTERN SALES AGENTS
AMERICAN DISTRIBUTING CO., Jackson, Mich.

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JOINTS (Continued)

UNIVERSAL JOINTS (Continued)

JAMESVILLE Mfg. Co., Batavia, N. Y.

K-B—See Kinsler-Bennett Co.

KINSLER-BENNETT Co., 69 Vernon St., Hartford, Conn. "K-B."
(See page 239.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

LEHMAN, I., 2187 E. Second St., Cleveland, O.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 383.)

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y. "Walters."

MERCHANT & Evans Co., Philadelphia, Pa. "Evans."
(See page 135.)

MICHIGAN Auto-Joint Co., 314 Bowery St., Grand Rapids, Mich.

MICHIGAN Wheel Co., Canal & Newberry Sts., Grand Rapids, Mich.

MUTUAL Machine Co., 25 Wells St., Hartford, Conn. "Warrens."

NEW England Auto Parts Mfg. Co., Kimball Bldg., Boston, Mass.

SMITH-SERRELL Co., 90 West St., New York, N. Y. "Francke."

SPICER Mfg. Co., Plainfield, N. J.
(See page 241.)

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

VACO—See Victor Appliance Co.

VICTOR Appliance Co., Troy, N. Y. "Vaco."
(See page 241.)

WALTERS—See Mechanical Devices Co.

WARRENS—See Mutual Machine Co.

WILCOX-McKIM Co., Saginaw, Mich.
(See page 197.)

KEYS

ACETYLENE GAS TANK KEYS

BUFFUM Tool Co., Louisiana, Mo.

EDELMANN & Co., E., 225 W. Illinois St., Chicago, Ill.

GILBERT Mfg. Co., New Haven, Conn.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

MOSSBERG Co., Frank, Attleboro, Mass.
(See page 557.)

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

STERLING Machine & Stamping Co., Wellington, O.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.
(See page 271.)

KITS

TIRE REPAIR KITS

(See also Cement, Tire; also Patches, Tire; also Plugs, Tire; also Sleeves, Tire)

AUTO Time Saver Repair Kit Co., 234-36 Congress St., Boston, Mass.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

H. J. K. Co., 26½ Canal St., Dayton, O. "Lightning."

HAZEN-BROWN Co., Court St., Brockton, Mass.

LIGHTNING—See H. J. K. Co.

M. & M. Mfg. Co., Akron, O.

MICHELIN Tire Co., Milltown, N. J.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

TINGLEY & Co., Chas. O., Rahway, N. J.

YATMAN Rubber Co., 257-69 Mt. Pleasant Ave., Newark, N. J.

KNUCKLES

STEERING KNUCKLES

(See Axles; also Forgings)

LACE

COACH LACE, WEBBING AND CORD

BRIDGEPORT Coach Lace Co., 17th St. & Fourth Ave., New York, N. Y.

COLUMBIA—See Horstmann Co.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."

SCHLEGEL Mfg. Co., College Ave. & N. Goodman St., Rochester, N. Y.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

LAMPS

ACETYLENE LAMPS OR HEAD-LIGHTS

AMERICAN Lamp Works, 253 W. 47th St., New York, N. Y. "Liberty."

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 243.)

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BROWN Mfg. Co., John W., Columbus, O.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill. "Diamond."

COLUMBIA—See Hine-Watt Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

DIAMOND—See Chicago Auto Lamp Works.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Majestic," "Victor."

Complete Index to Classification appears on Pages 8 to 22.

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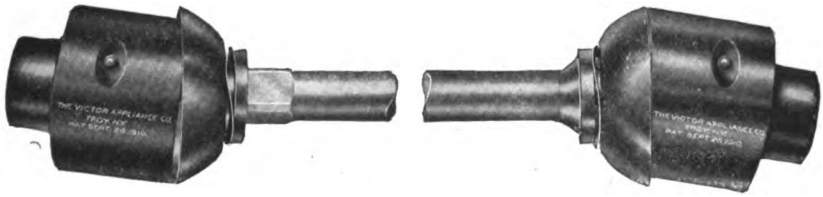

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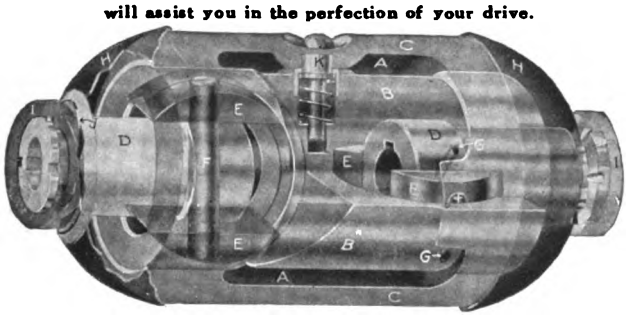

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LAMPS (Continued)

ACETYLENE LAMPS OR HEAD-LIGHTS (Continued)

DRESSEL Railway Lamp Works, 3860-80 Park Ave., New York, N. Y.

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J."
(See page 267.)

GRAY & Davis, Boston, Mass.
(See page 407.)

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn. "Old Sol."

HINE-WATT Mfg. Co., 180 N. Market St., Chicago, Ill. "Columbia."

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.

INDIANA Lamp Co., Connersville, Ind. "Lunar."

LIBERTY—See American Lamp Works.

LUNAR—See Indiana Lamp Co.

MAJESTIC—See Dietz Co.

NEVEROUT—See Rose Mfg. Co.

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

OLD SOL—See Hawthorne Mfg. Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

RUSHMORE Dynamo Works, Plainfield, N. J.
(See page 245.)

SAXON Mfg. Co., 205-19 Cherry St., Toledo, O.

SOLAR—See Badger Brass Mfg. Co.

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR—See Dietz Co.

VICTOR Lamp Co., Colerain & Sassafras Sts., Cincinnati, O.

WIDMAN & Co., J. C., 14th & 15th Sts. & G. T. Ry., Detroit, Mich.

DASH LAMPS

(See Lamps, Electric Dash)

ELECTRIC LAMPS OR HEAD-LIGHTS

(See Headlights, Electric)

ELECTRIC DASH OR GAUGE LAMPS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

APELCO—See Apple Electric Co.

APPLE Electric Co., 16 Canal St., Dayton, O. "Apelco."
(See page 159.)

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Cello."

CELLO—See Campbell Co.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

COWLES & Co., C., New Haven, Conn.
(See page 177.)

CULVER-STEARNS Mfg. Co., Worcester, Mass.
(See page 243.)

DOLLY Electric Specialty Co., 1461 Michigan Ave., Chicago, Ill.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 267.)

FAW, J. H., 41 Warren St., New York, N. Y.
(See page 585.)

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

MANHATTAN Electrical Supply Co., New York, N. Y.
(See page 533.)

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 153.)

S-H—See Stuart-Howland Co.

STUART-HOWLAND Co., 131-41 Federal St. Boston, Mass. "S-H."

VARNEY Electrical Supply Co., 235 S. Meridian St., Indianapolis, Ind. "Vesco."

VESCO—See Varney Electrical Supply Co.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

ELECTRIC GAUGE LAMPS

(See Lamps, Electric Dash)

ELECTRIC HAND OR INSPECTION LAMPS

(Lamp and flexible cord for attachment to ignition battery)

AMERICAN Enamel Co., Neville St., Providence, R. I. "Britelite."

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

BRITELITE—See American Enamel Co.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Cello."

CELLO—See Campbell Co.

CLUM Mfg. Co., Mitchell Bldg., Milwaukee, Wis.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

COWLES & Co., C., New Haven, Conn.
(See page 177.)

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

CRESCENT—See McGill Mfg. Co.

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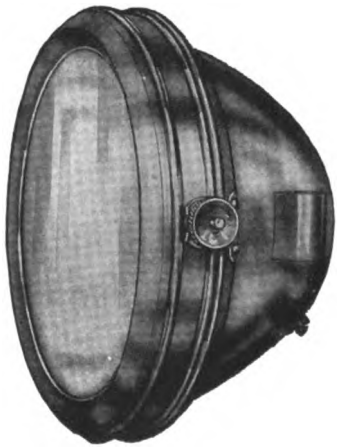

B. & L. Auto Lamp Co.

507-509 WEST 35th STREET
NEW YORK

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LAMPS (Continued)

ELECTRIC HAND OR INSPECTION LAMPS (Continued)

CULVER-STEARNS Mfg. Co., Worcester, Mass.
(See page 243.)

CUMMINGS Bros., 903 Saginaw St., Flint, Mich.

DE-LITE — See Franklin Specialty Co.

DOLLY Electric Specialty Co., 1461 Michigan Ave., Chicago, Ill.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 267.)

EVER READY—See American Ever Ready Co.

FLEXILYTE—See Williamson Co.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

FRANKLIN Specialty Co., Worcester Mass. "De-Lite."

GEISZLER Bros. Storage Battery Co., 1512-20 W. 57th St., New York, N. Y.
(See page 525.)

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HANDY-ANDY Electric Co., 1046 Lawrence Ave., Chicago, Ill.

HARVARD Electric Co., 525 W. Van Buren St., Chicago, Ill.

HIRSCH Electric Mine Lamp Co., 221-27 N. 23d St., Philadelphia, Pa.

McGILL Mfg. Co., 34 Oak St., Valparaiso, Ind. "Thumbswitch," "Crescent."

MANHATTAN Electrical Supply Co., New York, N. Y.
(See page 533.)

NIAGARA Searchlight Co., Niagara Falls, N. Y.

NITELITE—See Providence Electric Mfg. Co.

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Presto."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass. "Pomo."

PARKER Co., G. C., Boston, Mass. "Pomp."

POMO—See Morse, Frank W.

POMP—See Parker Co.

PRESTO—See Metal Specialties Mfg. Co.

PROVIDENCE Electric Mfg. Co., 23 Broad St., Providence, R. I. "Nitelite."

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 153.)

RUSSELL & Co., T. F., 170 Summer St., Boston, Mass.

S.-H.—See Stuart-Howland Co.

SHAIN, Chas. D., Box 53, Station L., Brooklyn, N. Y.
(See page 597.)

STUART-HOWLAND Co., 131-41 Federal St. Boston, Mass. "S-H."

THUMBSWITCH—See McGill Mfg. Co.

VARNEY Electrical Supply Co., 235 S. Meridian St., Indianapolis, Ind. "Vesco."

VESCO—See Varney Electrical Supply Co.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WILLIAMSON Co., L. A., 79 E. 130th St., New York, N. Y. "Flexilyte."

ELECTRIC INSPECTION LAMPS

(See Lamps, Electric Hand)

ELECTRIC SIDE AND TAIL LAMPS

A. B. Mfg. Co., Poughkeepsie, N. Y.

ADAMS-BAGNALL Electric Co., Cleveland, O.
(See page 243.)

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 245.)

ADLAKE—See Adams & Westlake Co.

ARBECO—See Reynolds-Browne Co.

ATLAS Stamping Co., 557-61 Jackson Blvd., Chicago, Ill. (Tail lamps only.)

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 243.)

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BROWN Mfg. Co., John W., Columbus, O.

BUFFALO Lamp Co., 106-10 Broadway, Buffalo, N. Y.

CAMPBELL Co., A. S., 284 Commercial St., Boston, Mass. "Cello."

CELLO—See Campbell Co.

CHICAGO Auto Lamp Works, 900-04 W. Lake St., Chicago, Ill.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O. "Pathfinder."

COWLES & Co., C., New Haven, Conn.
(See page 177.)

DEARBORN Hardware Mfg. Co., 2911-19 Carroll Ave., Chicago, Ill.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Excelsior."

DRESSEL Railway Lamp Works, 3860-80 Park Ave., New York, N. Y.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich.
(See page 267.)

ELECTROBOLA—See Garage Equipment Mfg. Co.

ENGLISH & Mersick Lamp & Foundry Co., 249 Park St., New Haven, Conn.

ESTERLINE Co., 228 E. South St., Indianapolis, Ind. "Golden Glow."

EXCELSIOR—See Dietz Co.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Electrobola."
(See page 221.)

GEM Stamped Steel Co. (Chelsea Station), Boston, Mass. (Tail lamps only.)

GOLDEN GLOW—See Esterline Co.

GRAY & Davis, Boston, Mass.
(See page 407.)

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAMMER Co., E. H., 1839 Euclid Ave., Cleveland, O.

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furnishes current for all lamps and keeps batteries charged automatically

USED ON PIERCE-ARROW AND LOCOMOBILE CARS

Adlake Lamps

combination oil and electric, with INSIDE oil pot

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We have been in the manufacturing business over fifty years.

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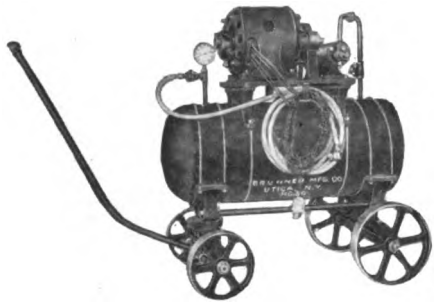

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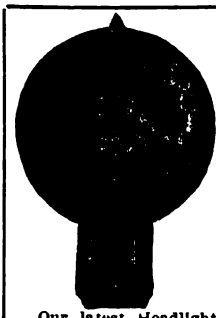

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LAMPS (Continued)

ELECTRIC SIDE AND TAIL LAMPS (Continued)

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

INDIANA Lamp Co., Connersville, Ind. "Lunar."

LUNAR—See Indiana Lamp Co.

NEVEROUT—See Rose Mfg. Co.

PATHFINDER—See Columbus Auto Brass Co.

REYNOLDS-BROWNE CO., 1312 Michigan Ave., Chicago, Ill. "Arbeco."

ROSCO—See Rosen & Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 153.)

SAXON Mfg. Co., 205-19 Cherry St., Toledo, O.

SOLAR—See Badger Brass Mfg. Co.

STAFFORD Auto Lamp & Number Co., 1475 Michigan Ave., Chicago, Ill. (Tail lamps only.)

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburgh), Pittsburg, Pa.

WHITE Mfg. Co., Bridgeport, Conn.

WIDMAN & Co., J. C., 14th & 15th Sts., & G. T. Ry., Detroit, Mich.

ELECTRIC TAIL LAMPS

(See Lamps, Electric Side and Tail)

GAUGE LAMPS

(See Lamps, Electric Dash or Gauge)

HAND LAMPS

(See Lamps, Electric Hand)

INSPECTION LAMPS

(See Lamps, Electric, Hand or Inspection)

MINIATURE TUNGSTEN LAMPS

BANNER Electric Works, Youngstown, O.

BRILLIANT Electric Co., Electric Bldg., Cleveland, O.

BRYAN-MARSH Electric Works, 481 S. Dearborn St., Chicago, Ill.

BUCKEYE Electric Works, B. of L. E. Bldg., Cleveland, O.

COLONIAL Electric Works, Warren, O.

COLUMBIA Incandescent Lamp Co., Equitable Bldg., St. Louis, Mo.

DOMESTIC Tungsten Lamp Co., 552 Gregory Ave., Weehawken, N. J.

ELUX Miniature Lamp Works, 324 Lafayette St., New York, N. Y.
(See page 247.)

FEDERAL Miniature Lamp Works, 501 S. Jefferson St., Chicago, Ill.

FOSTORIA Incandescent Lamp Works, Fostoria, O.

GENERAL Electric Co., Schenectady, N. Y. "Mazda."

GENERAL Incandescent Lamp Co., Electric Bldg., Cleveland, O.

HOWARD Miniature Lamp Co., Ampere, N. J.

INDEPENDENT Lamp & Wire Co., 1733 Broadway, New York, N. Y.
(See page 247.)

JAEGER Co., H. J., Terminal Bldg., Hoboken, N. J.
(See page 245.)

MAZDA—See General Electric Co.

PACKARD Lamp Works, Warren, O.

PEERLESS Lamp Works, Warren, O.

STERLING Electric Lamp Works, Warren, O.

U. S. INCANDESCENT Lamp Co., Laclede Bldg., St. Louis, Mo.

WESTINGHOUSE Lamp Co., Bloomfield, N. J.

OIL SIDE AND TAIL LAMPS

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 245.)

ADLAKE—See Adams & Westlake Co.

B. & L. Auto Lamp Co., 507-09 W. 35th St., New York, N. Y.
(See page 243.)

BADGER Brass Mfg. Co., Lyman Ave., Kenosha, Wis. "Solar."

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BROWN Mfg. Co., John W., Columbus, O "Perfection."

CHAMPION—See Dietz Co.

COLD BLAST—See Ham Mfg. Co.

CORCORAN Lamp Co., Reading Rd., Cincinnati, O.

COWLES & Co., C., New Haven, Conn.
(See page 177.)

DAINTY—See Dietz Co.

DIETZ Co., R. E., 60 Laight St., New York, N. Y. "Sterling, Jr.," "Queen," "Regal," "Ideal," "Orient," "Dainty," "Royal," "Champion," "Union," "Royal Junior."

DRESSEL Railway Lamp Works, 3860-80 Park Ave., New York, N. Y.

E & J—See Edmunds & Jones Mfg. Co.

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. "E & J".
(See page 267.)

ENGLISH & Mersick Lamp & Foundry Co., 249 Park St., New Haven, Conn.

GRAY & Davis, Boston, Mass.
(See page 407.)

HALL Lamp Co., C. M., Rivard & Hancock Sts., Detroit, Mich.

HAM Mfg. Co., C. T., 731 Oak St., Rochester, N. Y. "Cold Blast."

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LAMPS (Continued)

OIL SIDE AND TAIL LAMPS (Continued)

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.

IDEAL—See Dietz Co.

IDEAL Lamp Co., 216-18 Main St., Cincinnati, O.

INDIANA Lamp Co., Connersville, Ind. "Lunar."

LUNAR—See Indiana Lamp Co.

NEVEROUT—See Rose Mfg. Co.

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

ORIENT—See Dietz Co.

PERFECTION—See Brown Mfg. Co.

QUEEN—See Dietz Co.

REGAL—See Dietz Co.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa. "Neverout."

ROYAL—See Dietz Co.

ROYAL JUNIOR—See Dietz Co.

SAXON Mfg. Co., 205-19 Cherry St., Toledo, O.

SOLAR—See Badger Brass Mfg. Co.

STERLING, JR.—See Dietz Co.

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

UNION—See Dietz Co.

UNIVERSAL—See New York Coach & Auto Lamp Co.

VICTOR Lamp Co., Colerain & Sassafras Sts., Cincinnati, O.

WIDMAN & Co., J. C., 14th & 15th Sts. & G. T. Ry., Detroit, Mich.

SIDE LAMPS

(See Lamps, Electric Side; also Lamps, Oil Side)

TAIL LAMPS

(See Lamps, Electric Side and Tail; also Lamps, Oil, Side and Tail)

TUNGSTEN LAMPS

(See Lamps, Miniature Tungsten)

WIRE LAMPS

KENYON Searchlight Co., 11-15 Woodbridge St., Detroit, Mich.

LAVA

AMERICAN Lava Co., Chattanooga, Tenn.

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

LEATHER

ARTIFICIAL OR IMITATION LEATHER

ARMITAGE Leather Co., Detroit, Mich. (See page 249.)

BOSTON Artificial Leather Co., 200 Fifth Ave., New York, N. Y.

BULL DOG—See Mutty Co.

CARR Co., F. S., Boston, Mass. (See page 299.)

CHASE & Co., L. C., Boston, Mass. (See page 439.)

COOK'S Linoleum Co., Trenton, N. J.

du PONT Fabrikoid Co., Wilmington, Del.

GRANITOL—See Kearney Co.

HERCULES Rubber Co., 1-2 Hudson St., New York, N. Y. "Leatherite."

IMPERIAL—See Kearney Co.

KEARNEY Co., T. F., 27 School St., Boston, Mass. (Importers.) "Granitol," "Imperial." (See page 251.)

KERATOL Co., South & Van Buren Sts., Newark, N. J.

LEATHERITE—See Hercules Rubber Co.

MAROKENE Co., 6 Fletcher St., New York, N. Y.

MUTTY Co., L. J., Boston, Mass. "Bull Dog." (See page 133.)

O'BANNON Corp., 200 Fifth Ave., New York, N. Y. (See page 249.)

PANTASOTE Co., 11 Broadway, New York, N. Y.

FRICTION LEATHER

(For lining brakes and clutches—See also Banding, Brake; also Belting, Leather; also Fibre, Hard)

AMERICAN Belting & Tanning Co., 135 Oliver St., Boston, Mass.

BONNER & Barnewell, 30 Church St., New York, N. Y.

CAR-ROME—See National Leather Mfg. Co.

CHICAGO Belting Co., 113-25 N. Green St., Chicago, Ill.

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

COE & Brown, 202-04 George St., New Haven, Conn.

DETROIT Clutch Cover Co., 62-64 Jefferson Ave., Detroit, Mich.

DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

G & K—See Graton & Knight Mfg. Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." (See page 75.)

HIDE, Leather & Belting Co., Indianapolis, Ind. (See page 251.)

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O'BANNON LEATHER

Best Artificial Leather Made

We manufacture a variety of qualities suitable for all purposes for which real leather is used, in all the standard leather grains, colors and finishes.

MOLESKIN QUALITY

The Ideal Leather Substitute

has all the good points of genuine leather with none of its objectionable features. Equal in appearance to highest grade hand-buffed leather and costs less than cheap split leathers. Owing to its heavy weight, pliability, great strength and uniformity of quality, you avoid waste due to the soft and flanky places found in real leather, as every inch of this material can be utilized.

Write for Samples and Prices.

MANUFACTURED AND SOLD BY

O'BANNON CORPORATION, 200 Fifth Avenue, New York

ARMITAGE LEATHER CO.

DETROIT, MICH.

Natural and Artificial Leather for Automobile Upholstering, Tops and Inside Finishing

We are now in position to furnish

Artificial Leather

which in *Superior Finish, Durability* and *Price*, absolutely surpasses anything on the market.

This is a broad statement we prove.

Give Us The Opportunity.

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LEATHER (Continued)

FRICTION LEATHER (Continued)

HUDSON Belting Co., 1-3 Eaton Pl., Worcester, Mass.

M.L.B.—See Milwaukee Leather Belting Co.

MAU-SHERWOOD Supply Co., 1616 W. Third St., Cleveland, O. "Suregrip."

MILWAUKEE Leather Belting Co., 499 12th St., Milwaukee, Wis. "M. L. B."

NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich. "Car-Rome." (See page 77.)

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

PROVIDENCE Belting Co., 25 Charles St., Providence, R. I.

RAHMANN & Co., Geo., 31 Spruce St., New York, N. Y.

SCHIEREN, Co., Chas. A., New York, N. Y.

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo.

SUREGRIP—See Mau-Sherwood Supply Co.

TAYLOR Belting Co., 247 S. Meridian St., Indianapolis, Ind.

WAYNE Belting Co., 1212 Second Ave., Detroit, Mich.

WILDER & Co., Chicago, Ill.

WILLIAMS & Sons, I. B., Dover, N. H.

NATURAL LEATHER

AMERICAN Leather Mfg. Co., 438 Frelinghuysen Ave., Newark, N. J.

AMERICAN Oak Leather Co., Cincinnati, O.

ARMITAGE Leather Co., Detroit, Mich. (See page 249.)

ASHTABULA Hide & Leather Co., Ashtabula, O.

ATLANTIC Leather Co., 173 Wright St., Newark, N. J.

BADGER State Tanning Co., Sheboygan, Wis.

BEAVER—See Straus & Sons, M.

BLANCHARD Bro. & Lane, 20 Bruen St., Newark, N. J.

BRIDGEPORT Patent Leather Mfg. Co., Bridgeport, Conn. "Charter Oak."

BYRON & Sons, W. D., Williamsport, Md. "Tanok."

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind. (Dealers.)

CHARTER OAK—See Bridgeport Patent Leather Mfg. Co.

CLARK Leather Co., 723 Gough St., San Francisco, Cal. "Royal."

CLEVELAND Tanning Co., Jennings & Dennison Aves., S. W., Cleveland, O.

HERTZ, Max, 54-78 Oliver St., Newark, N. J.

HOWELL & Co., T. P., New & Nuttmann Sts., Newark, N. J. "Lion."

HOWELL-HINCHMAN Co., Middletown, N. Y.

HUDSON Leather Co., 15 Margaretta St., Newark, N. J.

LACKAWANNA Leather Co., Hackettstown, N. J.

LION—See Howell & Co.

OTTAWA Leather Co., Grand Haven, Mich.

PEARCE Bros. Leather Co., 768 Frelinghuysen Ave., Newark, N. J.

RADEL Leather Mfg. Co., Hamburg Place Rd., Newark, N. J.

RASER Tanning Co., Ashtabula, O.

REILLY, John, Ave. C & Murray St., Newark, N. J.

REILLY & Son, P., Mott St. & Passaic Ave., Newark, N. J. "Stag."

ROSER & Son, Hermann, Glastonbury, Conn.

ROYAL—See Clark Leather Co.

SHIELDS Bros., Bombay, N. Y.

SMITH Co., Hugh, 210 Central Ave., Newark, N. J.

SMITH & Sons, L. M., 59 Lock St., Newark, N. J.

STAG—See Reilly & Son.

STANDARD Leather Co. of Pittsburg, 296 Spring Garden Ave., N. S. Pittsburg, Pa.

STENGEL, Geo., Frelinghuysen & Elizabeth Aves., Newark, N. J.

STENGEL & Rothschild, Kossuth & Berlin Sts., Newark, N. J.

STRAUS & Sons, M., 440 Frelinghuysen Ave., Newark, N. J. "Beaver."

TANOK—See Byron & Sons.

TERWILLIGER-VINCENT Leather Co., 173 Wright St., Newark, N. J.

TURNER & Rutter, 32 Spruce St., New York, N. Y.

WARD & Co., E. S., 414 Frelinghuysen Ave., Newark, N. J.

WING Co., Charles, Amesbury, Mass. (Dealers.) (See page 507.)

RAWHIDE LACE LEATHER

(For preventing motor hoods or bonnets from rattling)

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill.

COCHECO—See Williams & Sons.

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

G & K—See Graton & Knight Mfg. Co.

GAY, Fred E., Thornton, R. I.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." (See page 75.)

HIDE, Leather & Belting Co., Indianapolis, Ind. (See page 251.)

LADEW, Est. of Edw. R., 82-84 Fulton St., New York, N. Y.

MISSOURI Belting Co., Grand Ave. & La Salle St., St. Louis, Mo. "Victor."

NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NATIONAL Leather Mfg. Co., Niles, Mich (See page 77.)

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

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MODERN equipment, backed by 40 years' experience, has produced our "Quality Line" of automobile specialties:

Wetprufe Fan Belts
Clutch Facings
Bonnet Lacing
Frame Padding
Strapping
Tenax Gaskets Etc.

To experience and equipment, we add dependable service and attractive prices. Let us quote you.

Hide, Leather & Belting Company
INDIANAPOLIS, IND.

Highest Quality Mohairs and Mackintoshed Cloths for Tops and Seatcovers

ABSOLUTELY RELIABLE IN QUALITY

REMARKABLY LOW IN PRICE

Sole manufacturers of

Bryn Mawr Upholstery Cloth

Especially adapted to upholstering touring cars and roadsters in place of leather. Wears longer, is more attractive and comfortable, costs less and eliminates seatcovers. Samples and prices on request.

W. A. & J. C. Haartz, Inc.
Boston, Mass.

MOST PERFECT IMITATIONS ON THE MARKET

WILL OUTLAST THE CAR

GRANITOL AND IMPERIAL ARTIFICIAL LEATHERS

Every Grain

Every Color

IMPORTED PRODUCTS WITH EVERY MERIT OF HIGH GRADE LEATHER BUT NONE OF ITS DEFECTS OR WASTE

WEARS BETTER

LOOKS BETTER

IS BETTER THAN LEATHER FOR UPHOLSTERING & TOPS

1½ YARD WIDE 60¢ TO $2.00 THE YARD

T·F·KEARNEY Co.
IMPORTERS & SOLE AGENTS
27 SCHOOL ST. BOSTON, MASS.

LAIDLAWS BURBANK Motor Cloths

THE TOP AT THE TOP

For Auto Tops and Slip Covers

Never Leak

They contain no rubber.
Are absolutely waterproof.
Are unaffected by climatic conditions.

Send for samples.

Wm. R. Laidlaw, Jr.
Specialist in Auto Fabrics
126-132 W. 46th St.,
New York City.

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LEATHER (Continued)

RAWHIDE LACE LEATHER (Continued)

NORWICH Belt Mfg. Co., Norwich, Conn.

PACIFIC Leather Works, 239 12th St., Oakland, Cal.

RAHMANN & Co., Geo., 31 Spruce St., New York, N. Y.

RICHMOND Leather Mfg. Co., 2201-01 E Cary St., Richmond, Va.

SHULTZ Belting Co., 402 Barton St., St. Louis, Mo.

VICTOR—See Missouri Belting Co.

WEATHERHEAD-THOMPSON Co., Pawtucket, R. I.

WILLIAMS & Sons, I. B., Dover, N. H. "Cocheco."

LEGGINGS

MOTORISTS LEGGINGS

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill. "Reliance," "Napoleon," "Tooinone," "Universal," "Boulevard," "Harvard," "National."

BOULEVARD—See Atlas Specialty Mfg. Co.

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

HAGERSTOWN Legging Co., Hagerstown, Md. "Halco."

HALCO—See Hagerstown Legging Co.

HARVARD—See Atlas Specialty Mfg. Co.

NAPOLEON—See Atlas Specialty Mfg. Co.

NATHAN Novelty Mfg. Co., 90G Reade St., New York, N. Y.
(See page 671.)

NATIONAL—See Atlas Specialty Mfg. Co

PREMIER Auto Novelty Mfg. Co., 375 W. Broadway, New York, N. Y.

RELIANCE—See Atlas Specialty Mfg. Co.

SYRACUSE & Eldridge Glove & Legging Co., 1020 S. Salina St., Syracuse, N. Y.

TOOINONE—See Atlas Specialty Mfg. Co.

UNIVERSAL—See Atlas Specialty Mfg. Co.

WILEY & Son Co., Wm. H., 80 Pliny St., Hartford, Conn.

LEVERS

BRAKE AND GEAR SHIFT LEVERS

(Finished or Machined Levers. For Levers in the rough—See Castings; also Forgings)

AMERICAN Die & Tool Co., Second & Buttonwood Sts., Reading, Pa.

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind.
(See page 135.)

BIGGAM Engineering Co., Lansing St. & Military Rd., Buffalo, N. Y.

BILLINGS & Spencer Co., Hartford, Conn.

COTTA Gear Co., Ninth St. & 19th Ave., Rockford, Ill.

COTTA Transmission Co., 814 S. Main St., Rockford, Ill.
(See page 199)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

HALLADAY Co., L. P., Streator, Ill.

HAZARD Motor Mfg. Co., 23 Scherer St., Rochester, N. Y.

JAMESVILLE Mfg. Co., Batavia, N. Y.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

LEFEVER Arms Co., 1 Maltbie St., Syracuse, N. Y.

LEWIS Spring & Axle Co., Jackson, Mich.

OOSTDYK Gear Shifter Co., Goldberg Bldg., Detroit, Mich.

PIPER Machine Co., 560-70 N. Elder Ave., Indianapolis, Ind.

WABASH Gear Works, Tenth & Farrington Sts., Terre Haute, Ind.

WARNER Co., T. W., Kilgore & Perkins Aves., Muncie, Ind.

WARNER Gear Co., Muncie, Ind.
(See page 253.)

WARNER Mfg. Co., Toledo, O.
(See page 481.)

LIGHTERS

ACETYLENE LAMP LIGHTERS

(See also Burners, Special Acetylene Lamp)

ADJUSTABLE Lighter Co., 18 Pearl St., Newton, Mass.

ADVANCE Motor Specialties Co., 508 S. Dearborn St., Chicago, Ill. "Matchless."

AJAX Auto Lighter Co., Lansing, Mich.

AUBEUF Co., F. H., Oneida, N. Y.

AUTOMOBILE Lighting Co., Holyoke, Mass "Frary."

BENEFIEL Co., Chas. E., Industrial Bldg., Indianapolis, Ind.

BENFORD Mfg. Co., Box H., Mt. Vernon, N. Y. "Monarch."
(See page 599.)

DUNN-RAY Co., 12 Pearl St., Boston, Mass.

FEESER Co., Frank S., 1102 Prospect St. Indianapolis, Ind. "Superior."

FLASH—See Motor Specialties Co.

FRARY—See Automobile Lighting Co.

G. C. A. Mfg. Co., Pittsfield, Mass. "Grinnell."

GRINNELL—See G. C. A. Mfg. Co.

HAIGHT Auto Lighter Co., Lansing, Mich.

HANNA Starter Co., 701 S. Salina St., Syracuse, N. Y.

HOME Light Co., 2108 Dayton St., Chicago, Ill. "U. S."

INST Lighter Co., 59 E. Main St., Columbus, O.

MATCHLESS—See Advance Motor Specialties Co.

MONARCH—See Benford Mfg. Co.

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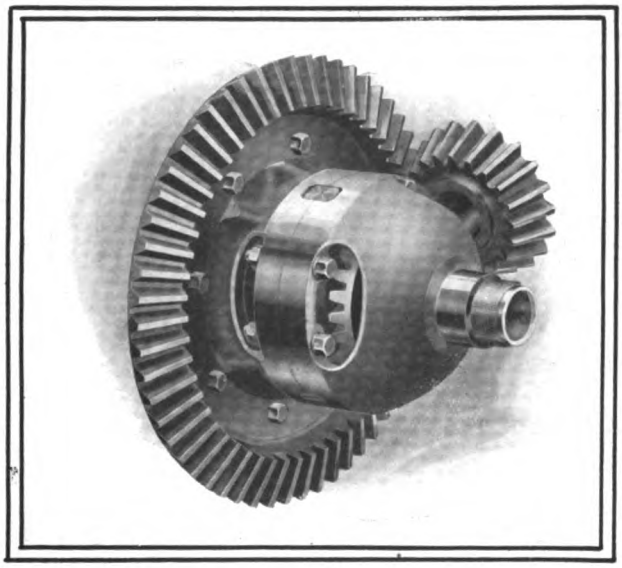
TRANSMISSIONS—STEERING GEARS

CLUTCHES

DIFFERENTIALS CONTROL LEVERS



"Our engineering department is your engineering department"

"THE ORIGINAL"

WARNER GEAR CO.

MUNCIE, IND.

DETROIT OFFICE—628 FORD BLDG.

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LIGHTERS (Continued)

ACETYLENE LAMP LIGHTERS (Continued)

MOTOR Specialties Co., Waltham, Mass. "Flash."

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

ROUSSEAU, David, Ossining, N. Y.

SAFETY Gas Lighter Co., 26-28 Wingate St., Haverhill, Mass.

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "Spark-O-Lite."

SIMPLEX Appliance Co., Majestic Bldg., Indianapolis, Ind.

SPARK-O-LITE—See Sager Co.

SUPERIOR—See Feeser Co.

U. S.—See Home Light Co.

ELECTRIC CIGAR LIGHTERS

CENTURY—See Mabeys Electric & Mfg. Co.

COWLES & Co., C., New Haven, Conn. (See page 177.)

MABEYS Electric & Mfg. Co., 940 N. Pennsylvania St., Indianapolis, Ind. "Century."

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Presto."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

PRESTO—See Metal Specialties Mfg. Co.

OIL LAMP LIGHTERS

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

HOFACKER Mfg. Co., 553-55 W. 42d St., New York, N. Y.

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

HUDSON-FULTON—See Storage Battery Supply Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco." (See page 153.)

STORAGE Battery Supply Co., 239 E. 27th St., New York, N. Y. "Hudson-Fulton."

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WHITE Mfg. Co., Bridgeport, Conn.

ELECTRIC GAUGE LIGHTS

(See Lamps, Electric Dash)

ELECTRIC HEADLIGHTS

(See Headlights, Electric)

WASH STAND LIGHTS

(For Lighting Car on Wash Stand)

ALADDIN—See Smith Mfg. Co.

SMITH Mfg. Co., I. J., 1007 Ave. Q, Brooklyn, N. Y. "Aladdin."

LIGHTS

ELECTRIC DOME LIGHTS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

APELCO—See Apple Electric Co.

APPLE Electric Co., 16 Canal St., Dayton, O. "Apelco." (See page 159.)

CAMPBELL Co., A. S., 284 Commercial St. Boston, Mass. "Cello."

CELLO—See Campbell Co.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

COWLES & Co., C., New Haven, Conn. (See page 177.)

CULVER-STEARNS Mfg. Co., Worcester, Mass. (See page 243.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

GUIDE Motor Lamp Mfg. Co., 11400 W. Madison Ave., Cleveland, O.

LINING

BRAKE LINING

(See Banding, Brake; also Leather, Friction; also Fibre, Hard)

LINOLEUM

AMERICAN Linoleum Mfg. Co., 366 Fifth Ave., New York, N. Y.

ARMSTRONG Cork Co., 23d St. & Railroad Ave., Pittsburg, Pa.

BLABON Co., Geo. W., 21st St. & Hunting Park Ave., Philadelphia, Pa.

COOK'S Linoleum Co., Trenton, N. J.

LIN-RHUBER—See Nairn Linoleum Co.

MONARCH Rubber & Oil Cloth Co., 41 N. Seventh St., Philadelphia, Pa.

NAIRN Linoleum Co., Newark, N. J. "Lin-Rhuber." (See page 255.)

POTTER, Sons & Co., Thomas, Lafayette Bldg., Philadelphia, Pa.

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NAIRN'S LINOLEUM

FOR FLOORS AND RUNNING BOARDS OF AUTOMOBILES AND MOTOR BOATS

NOT AFFECTED BY GASOLINE, OIL, OR GREASE.

MADE ANY COLOR

Styles and Prices furnished upon request.

Complete stock carried at the mill at Newark, N. J., also in our warehouses at Chicago, Kansas City, St. Louis, Los Angeles, San Francisco, Seattle, Portland and Texas City.

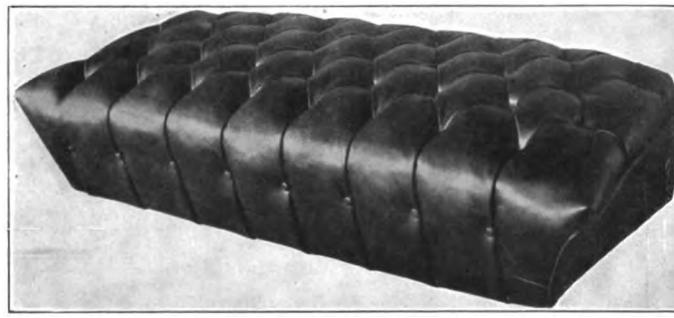
THE NAIRN LINOLEUM COMPANY

NEWARK, N. J.

NAIRN'S

REGISTERED TRADE MARK

W. & J. SLOANE,
5th Ave. and 47th St., NEW YORK,
Distributing Agents.



NEGLIGEE OR TURKISH CUSHION

12 Inches High in Front

This type of cushion is considered the acme of the Upholsterer's Art, and heretofore has been made only by hand. We are now in position to furnish devices (for which patents are pending) with which this type of cushion can be constructed at practically the same labor cost as the ordinary Soft-Faced or Spring-Edge Cushion.

Full particulars upon request.

Novelty Tufting Machine Company

"Originators of Upholstering Devices."

268 Jefferson Avenue, East Detroit, Michigan, U. S. A.

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LOCKS

AUTOMOBILE LOCKS

(For Locking Steering Gears or Gear Levers; For Lock Switches—See Switches, Electric Lock; For Lock Valves—See Valves, Gasoline Lock)

AMERICAN Chain Co., Sherrill, N. Y.

AUTO Specialty Co., 2144 Madison Ave., Toledo, O.

B. & W.—See Universal Mfg. Co.

BACKUS Novelty Co., 612 Water St., Smethport, Pa. (See page 257.)

BENHAM—See Shroyer & Co.

BRACELET Auto Lock Co., 32 N. Clark St., Chicago, Ill.

BREAKSTONE, S., 1712 S. Michigan Ave., Chicago, Ill. "Watch Dog."

BREMER-WILSON Mfg. Co., 1421 Michigan Ave., Chicago, Ill. "Triplex."

BULLDOG—See Consolidated Machine Works.

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See page 497.)

CONSOLIDATED Machine Works, 6036-38 Wentworth Ave., Chicago, Ill. "Bulldog."

FAIRCHILD, H. C., Maplewood, N. J.

FORD Lock Co., 1042 S. Olive St., Los Angeles, Cal.

GENERAL Utility Co., 1326-30 Ogden St., Philadelphia, Pa. "Parker."

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill.

MABEYS Electric & Mfg. Co., 940 N. Pennsylvania St., Indianapolis, Ind.

MILLER Hardware Co., T. T., 30-32 N. Fourth St., Easton, Pa.

NEUTRA-LOCK—See U. S. Auto-Lock Co.

NORISKO—See Rogers Mfg. Co.

PARKER—See General Utility Co.

ROBE Lock Co., 172 12th St., Oakland, Cal.

ROCHESTER Safety Lock Co., 530 Main St., Rochester, Ind.

ROGERS Mfg. Co., C. J., Broad & Race Sts., Philadelphia, Pa. "Norisko." (See page 215.)

SHROYER & CO., G. W., 102-06 Main St., N. Dayton, O. "Benham."

TRIPLEX—See Bremer-Wilson Mfg. Co.

U. S. Auto-Lock Co., Findlay, O. "Neutra-Lock."

UNIVERSAL Mfg. Co., Racine, Wis. "B. & W." (See page 665.)

WATCH DOG—See Breakstone, S.

WELCH Bros., Pontiac, Mich. (See page 441.)

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y. (See page 259.)

CABINET AND PADLOCKS

AMERICAN Keyless Lock Co., 619 W. Jackson Blvd., Chicago, Ill.

CORBIN Cabinet Lock Co., New Britain, Conn.

EAGLE Lock Co., Terryville, Conn.

FRAIM Lock Co., E. T., Park Ave. & Jefferson St., Lancaster, Pa.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y. (See page 259.)

DOOR LOCKS

ÆTNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

BRAINERD Mfg. Co., East Rochester, N. Y.

COWLES & Co., C., New Haven, Conn. (See page 177.)

DOUGLAS & Lomason Co., Detroit, Mich.

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

LOOPS

BRASS SNAP AND STRAP LOOPS

(See also Fittings, Top)

ANCHOR—See North & Judd Mfg. Co.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich. (See page 341.)

COWLES & Co., C., New Haven, Conn. (See page 177.)

CRANDAL, Stone & Co., Binghamton, N. Y. (See page 379.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

DOUGLAS & Lomason Co., Detroit, Mich.

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass.

NORTH & Judd Mfg. Co., New Britain, Conn. "Anchor."

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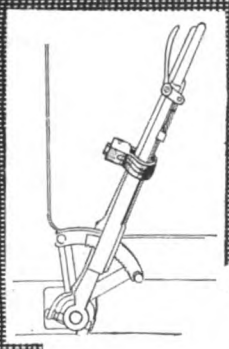
BACKUS

A lock that makes the car and its contents SAFE



Dealers—Are You Alive To Your Opportunities?

Second only to the stealing of cars are the petty thefts of articles left in them. Many a trip has been spoiled by the necessity of taking luggage, wraps, robes, etc., with you every time you leave your car. The number of these automobile thefts—amounting to over $1,000,000 annually—has created the market for the BACKUS UTILITY AUTO LOCK. Every automobilist in the country is a live prospect for you, Mr. Dealer; prove the demand by placing a small order.

The accompanying illustrations show only a few of the many uses to which the BACKUS is adapted. Coats, gloves, robes, hats, suit-cases, etc., can be safely secured; in cold weather the robe thrown over the radiator can be secured so that it cannot be stolen or blown away; snapped to the side levers or throttle levers on the steering wheel it will assure your finding your car where you left it. Locks made of case-hardened steel. The rounded teeth of the jaws will not injure the goods, although gripping like a bull-dog. Jaws open 4½ inches. Snapped on in a moment and cannot be removed without unlocking.

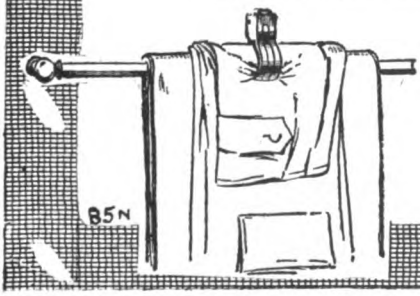
PRICES:

Package containing one lock	$1.00
Package containing two locks	2.00
Package containing three locks	3.00

The sets of 2 and 3 locks are of same key combination—2 keys with each lock—enabling user to give keys to those whom he wishes to have access to the locks.

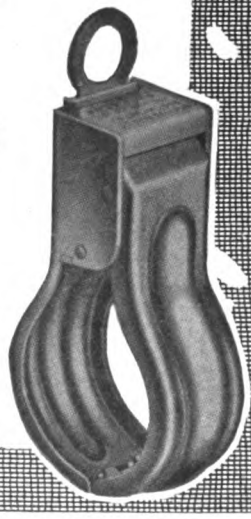
LIBERAL DISCOUNTS TO DEALERS

Write for dealers' proposition and circular.



BACKUS NOVELTY COMPANY

612 Water St.,
Smethport, Pa., U. S. A.



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LOOPS (Continued)

BRASS SNAP AND STRAP LOOPS (Continued)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

SMITH & Co., Jos. N., Detroit, Mich.
(See page 93.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.
(See page 271.)

WIENER-BARNET Co., 312-28 Adams St. Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

LUBRICANTS

OILS AND GREASES

(See Oils, Lubricating; also Greases, Cup and Gear)

LUBRICATORS

HAND LUBRICATORS OR OIL PUMPS

COX Brass Mfg. Co., Albany, N. Y.
(See page 467.)

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

LUNKENHEIMER Co., 228 E. Eighth Ave., Cincinnati, O.

MECHANICAL LUBRICATORS OR OIL PUMPS

(Engine driven Oil Pumps)

BOSCH Magneto Co., 228 W. 46th St., New York, N. Y.

DETROIT Lubricator Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

KINSEY Mfg. Co., Toledo, O. "Kinwood."
(See page 153.)

KINWOOD—See Kinsey Mfg. Co.

LEE Co., Wm. O., Port Huron, Mich.
(See page 125.)

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

LUNKENHEIMER Co., 228 E. Eighth Ave., Cincinnati, O.

McCORD Mfg. Co., Detroit, Mich. "Precision."
(See pages 334 and 335.)

MADISON-KIPP Lubricator Co., Madison, Wis.

MANZEL, Charles W., 319 Babcock St., Buffalo, N. Y.

MANZEL Bros. Co., 320 Babcock St., Buffalo, N. Y.
(See page 327.)

NEELY Mfg. Co., 829 Wells St., Chicago, Ill.

OSGOOD Lubricator Co., J. L., Erie County Bank Bldg., Buffalo, N. Y.

PEDERSEN Lubricator Co., 636 First Ave., New York, N. Y.
(See page 259.)

PRECISION—See McCord Mfg. Co.

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis.

WEISS, L. T., 293 Taaffe Pl., Brooklyn, N. Y.
(See page 259.)

OIL AND GREASE CUP LUBRICATORS

(See Cups, Oil and Grease)

PRESSURE LUBRICATORS

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

KRAHN Mfg. Co., Enterprise Bldg., Milwaukee, Wis.

PEDERSEN Lubricator Co., 636 First Ave., New York, N. Y.
(See page 259.)

SHERWOOD Mfg. Co., Elmwood Ave. & Belt Line, Buffalo, N. Y.

WILKINSON Co., Wm. H., West Medway Mass.

LUGS

TIRE LUGS

CLARK Novelty Co., 380 Exchange St., Rochester, N. Y.

CRYDER & Co., 583 Park Ave., New York, N. Y. (Importers.) "Hermetic."

DIEN, Ch., 17 Battery Pl., New York, N. Y. (Importers.) "Edco."

EDCO—See Dien, Ch.

HERMETIC—See Cryder & Co.

STERLING Machine & Stamping Co., Wellington, O.

LUMBER

ARTIFICIAL LUMBER

GARDNER Artificial Lumber Co., Barberton, O.

AUTOMOBILE LUMBER

ANDERSON-TULLY Co., Memphis, Tenn.

APPALACHIA Lumber Co., Columbus, O.

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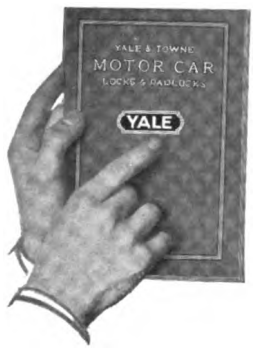

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LUMBER (Continued)

AUTOMOBILE LUMBER (Continued)

BAKER Lumber Co., Turrell, Ark.

CARRIER Lumber & Mfg. Co., Sardis, Miss.

DARLING Lumber Co., J. W., Cincinnati, O.

GREBLE-SINE Lumber Co., Peoples Gas Bldg., Chicago, Ill.

HIMMELBERGER-HARRISON Lumber Co., Cape Girardeau, Mo.

HOFFMAN Bros. Co., 800 W. Main St., Fort Wayne, Ind.

LAMB-FISH Lumber Co., Charleston, Miss.

LEONARD, H. R., Seaboard Bank Bldg., Norfolk, Va.

LOVE, Boyd & Co., ft. S. Second St., Nashville, Tenn.

LUEHRMANN Hardwood Lumber Co., Chas. F., St. Louis, Mo.

MALEY, Thompson & Moffett Co., Cincinnati, O.

MOORE & McFerren, Memphis, Tenn.

NEW River Lumber Co., Union Trust Bldg., Cincinnati, O.

PAEPKE-LEICHT Lumber Co., 940 W. Chicago Ave., Chicago, Ill.

SHIELS & Co., Charles F., McLane Ave. & Gest St., Cincinnati, O.

SULLIVAN & Co., T., Niagara & Arthur Sts., Buffalo, N. Y.

TAUSSIG, L. J., Commercial Bldg., St. Louis, Mo.

THREE States Lumber Co., Memphis, Tenn.

MACHINE WORK

SPECIAL MACHINE WORK TO ORDER

(See also Screw Machine Products)

ADAPT Machinery Co., 1610 Wabash Ave., Chicago, Ill.

ADVANCE Machine Co., 654-58 Franklin St., Detroit, Mich.

ÆTNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Air Compressor Co., 1523-31 W. Fort St., Detroit, Mich.

AMERICAN Car & Ship Hardware Mfg. Co., 2-4 Mechanic St., New Castle, Pa.

AMERICAN Die & Tool Co., Second & Buttonwood Sts., Reading, Pa.

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 261.)

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 341.)

AUTOPARTS Mfg. Co., Dept. 1, Detroit, Mich.
(See page 379.)

BETTCHER Mfg. Co., Cleveland, O.

BILLINGS & Spencer Co., Hartford, Conn.

BLACK & Decker Mfg. Co., 113-15 S. Calvert St., Baltimore, Md.

BLAIR Tool & Machine Works, 521 Greenwich St., New York, N. Y.

BLAKE & Johnson Co., Waterbury, Conn.

BLANCHARD Machine Co., 64 State St., Cambridge, Mass.

BROWN Cotton Gin Co., 38 Pequot Ave., New London, Conn.

BUDA Co., Harvey, Ill.
(See page 377.)

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O.
(See page 111.)

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHESTERMAN & Streeter, 125 N. Seventh St., Philadelphia, Pa.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CLARK Novelty Co., 380 Exchange St., Rochester, N. Y.

CLIMAX Machinery Co., 143-63 E. Morris St., Indianapolis, Ind.

CONOVER-OVERKAMP Machine & Tool Co., 841 W. Germantown St., Dayton, O.

COOPER Machine Works, Eighth Ave. & 18th St., Brooklyn, N. Y.

CURRIE & Son, J. B., 72 Adams St., Brooklyn, N. Y.

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

DETROIT Gear & Machine Co., 127-51 Franklin St., Detroit, Mich.

DETROIT Motor Casting Co., 299-303 Beaufait Ave., Detroit, Mich.

DIAMOND Chain & Mfg. Co., Indianapolis, Ind.
(See page 127.)

DIEBOLD Products Co., 5333-37 St. Clair Ave., Cleveland, O.

DITWILER Mfg. Co., Galion, O.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

EASTERN Machine & Stamping Co., 15 Wickenden St., Providence, R. I.

EDWARDS Engineering & Mfg. Co., 45 Austin St., Newark, N. J.

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich.
(See page 281.)

FERRO Machine & Foundry Co., 47 Hubbard Ave., Cleveland, O.
(See pages 574 and 575.)

FORE River Shipbuilding Corp., Quincy, Mass.

FORT Dearborn Mfg. Co., 1574-80 Crossing St., Chicago, Ill.

FRIES & Co., Buffalo, N. Y.

FRONTIER Engineering Co., 816-36 Fort St. W., Detroit, Mich.

FROST Gear & Machine Co., Jackson, Mich.
(See page 235.)

FULLER & Sons Mfg. Co., Kalamazoo, Mich.

FULTON Mfg. Co., Erie, Pa.

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MACHINE WORK (Continued)

SPECIAL MACHINE WORK TO ORDER (Continued)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y.

GEIER Co., P. A., 5112 St. Clair Ave., E., Cleveland, O.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 447.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 91.)

GOETZ Co., 1802 Clybourn Ave., Chicago, Ill.

GOODSPEED-DETROIT Mfg. Co., 272-80 Harper Ave., Detroit, Mich.

GREENHALGH, G. H., Newark, N. J.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 429.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HILES & Co., C. A., 14th St. & Western Ave., Chicago, Ill.

HOUPERT Machine Co., 351-55 W. 52d St., New York, N. Y.

HULL Mfg. Co., Lansing, Mich.
(See page 307.)

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

INDIANAPOLIS Tool & Mfg. Co., Indianapolis, Ind.

JACOBSON Machine Mfg. Co., Warren, Pa.
(See page 531.)

JOHNSTON & Jennings Co., 877 Addison Rd., Cleveland, O.

JOSTS Sons, Edmund, 46-48 Dickerson St., Newark, N. J.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KELLS Foundry & Machine Co., East Gary, Ind.

KERMATH Mfg. Co., 45 Fort St. E., Detroit, Mich.

KIDDER-OSWALD Co., Dayton, O.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

KRAHN Mfg. Co., Enterprise Bldg., Milwaukee, Wis.

LEE Co., Wm. O., Port Huron, Mich.
(See page 125.)

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 383.)

LIMERICK Co., J. Arthur, Howard St. & Park Ave., Baltimore, Md.

LINK-BELT Co, Indianapolis, Ind.
(See page 431.)

LONG Machine Works, Adam A., Rochester, N. Y.

LYCOMING Foundry & Machine Co., Williamsport, Pa.
(See page 445.)

McINTYRE Mfg. Co., 172-82 W. Locust St., Columbus, O.

MASSACHUSETTS Machine Shop, 100 Beacon St., Worcester, Mass.

MASSNICK-PHIPPS Mfg. Co., 1091 Champlain St., Detroit, Mich.

MECHANICAL Devices Co., 917 First Ave., Watervliet, N. Y.

METROPOLITAN Mfg. Co., Detroit, Mich.

MILHOLLAND Machine Co., W. K., Tenth & Canal Sts., Indianapolis, Ind.

MODERN Machinery Co., Monroe & Fifth Sts., Wilmington, Del.

MOORE & Co., 301 W. Grand Ave., Chicago, Ill.

MURPHY-POTTER Co., Detroit, Mich.

MURRAY Machine Works, 1924 Wabansia Ave., Chicago, Ill.

NATIONAL Cycle & Mfg. Co., Bay City, Mich.

NATIONAL Engineering Co., Saginaw, Mich.
(See page 581.)

NATIONAL Sewing Machine Co., Belvidere, Ill.

NATIONAL Stamping & Electric Works, 410-26 Clinton St., Chicago, Ill.

NEWARK Stamping Co., Newark, O.
(See page 423.)

NILSON-MILLER Co., 13th & Hudson Sts., Hoboken, N. J.

OBERDORFER Brass Co., M. L., 804 E. Water St., Syracuse, N. Y.

OFFENHAEUSER & Dotsch, 41 Beekman Ave. (N. Tarrytown), Tarrytown, N. Y.

PETERS Machine & Mfg. Co., Whitney Power Bldg., Cleveland, O.

PIONEER Brass Works, Indianapolis, Ind.
(See page 113.)

PIPER Machine Co., 560-70 N. Elder Ave., Indianapolis, Ind.

PROSSER Engineering Co., 2106 W. Superior Ave., Cleveland, O.

PROVIDENCE Engineering Works, 521 S. Main St., Providence, R. I.

ROSS Machine Co., 208 S. Fourth St., La Fayette, Ind.

SAYRE Stamping Co., Sayre, Pa.

SCALLAN & Co., W. E., 1123-25 Gest St., Cincinnati, O.
(See page 555.)

SCHATZ Mfg. Co., 17 Fairview Ave., Poughkeepsie, N. Y.

SELIK Bros., 254-56 Meldrum Ave., Detroit, Mich.

SHIMER & Sons, Samuel J., Milton, Pa.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 533.)

SLOAN & Chace Mfg. Co., Sixth Ave. & 13th St., Newark, N. J.

SMITH Mfg. Co., Philip, Sidney, O.

SOUTH Norwalk Engineering Co., 10 R. R. Ave., South Norwalk, Conn.

SPACKE Machine Co., F. W., Indianapolis, Ind.
(See page 305.)

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

STERLING Machine Co., Norwich, Conn.

SUPERIOR Machine & Engineering Co., 51-53 Fort St. E., Detroit, Mich.

SUPERIOR Metal Products Co., Elyria, O.
(See page 403.)

T. C. M. Mfg. Co., Hunterdon & First Sts., Harrison, N. J.

TAFT-PEIRCE Mfg. Co., Woonsocket, R. I.

TURNER & Moore Mfg. Co., 54 Champlain St., Detroit, Mich.

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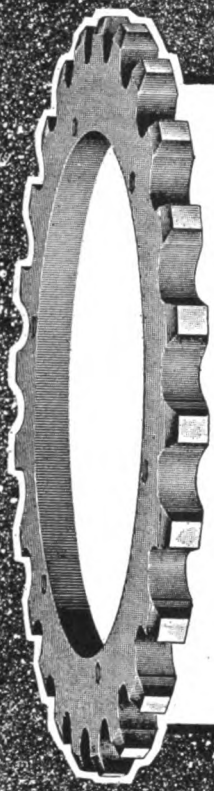

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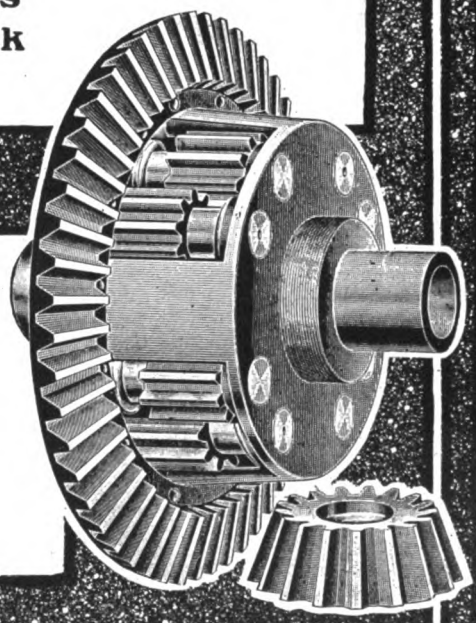

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MACHINE WORK (Continued)

SPECIAL MACHINE WORK TO ORDER (Continued)

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.

UNIVERSAL Mfg. Co., Racine, Wis. (See page 665.)

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E., Detroit, Mich.

WADE Machine Co., 817 Albany St., Boston, Mass.

WAINWRIGHT & Son, W. W., Connersville, Ind. (See page 307.)

WALKER Co., H. J., 40 Champlain St., Detroit, Mich.

WARNER Bros. Machine Works, High & Howard Sts., Muncie, Ind.

WEISS, L. T., 293 Taaffe Pl., Brooklyn, N. Y. (See page 259.)

WEST & Dodge, 384 Atlantic Ave., Boston, Mass.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WESTINGHOUSE Machine Co., (E. Pittsburg), Pittsburg, Pa.

WILCOX-McKIM Co., Saginaw, Mich. (See page 197.)

MAGNETOS

IGNITION MAGNETOS AND DYNAMOS

AUTO-SPARKER—See Motsinger Device Mfg. Co.

BERLING—See Ericsson Mfg. Co.

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

BRIGGS Magneto Co., Elkhart, Ind.

CHAMPION Ignition Co., Flint, Mich. (See page 591.)

COMET—See Hendricks Novelty Co.

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See page 497.)

DAYTON-DICK Co., Quincy, Ill. (See page 409.)

DEAN Electric Co., 2515 Taylor St., Elyria, O. "Elyria-Dean." (See page 138.)

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

ECONOMY Electric Co., Economy, Pa. "Perfection."

EISEMANN Magneto Co., 225-27 W. 57th St., New York, N. Y. (See page 265.)

ELKHART Mfg. Co., First St. & Conant Ave., Monroe, Mich. "Monroe."

ELYRIA-DEAN—See Dean Electric Co.

ERICSSON Mfg. Co., 1121 Military Rd., Buffalo, N. Y. "Berling."

EUREKA—See Henricks Novelty Co.

HEINZE Electric Co., Lowell Mass. (See page 581.)

HENRICKS Novelty Co., 1237-39 St. Paul St., Indianapolis, Ind. "Eureka," "Comet."

HERZ & Co., New York, N. Y. (Importers.) (See page 599.)

HOLTZER-CABOT Electric Co., Brookline, Mass. (See page 231.)

K-W Ignition Co., 2833 Chester Ave., Cleveland, O.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

MARBURG Bros., 1790 Broadway, New York, N. Y. (Importers.) "Mea." (See page 589.)

MEA—See Marburg Bros.

MENOMINEE Electric Mfg. Co., Menominee, Mich.

MONROE—See Elkhart Mfg. Co.

MOTSINGER Device Mfg. Co., Lafayette, Ind. "Auto-Sparker."

NATIONAL Coil Co., Lansing, Mich.

PERFECTION—See Economy Electric Co.

PHILADELPHIA Timer & Machine Co., Philadelphia, Pa. "Velos." (See page 525.)

PITTSFIELD Spark Coil Co., Dalton, Mass. (See page 141.)

QUICK ACTION — See Knoblock-Heideman Mfg. Co.

REMY Electric Co., Anderson, Ind. (See page 497.)

SIMMS Magneto Co., Bloomfield, N. J.

SPLITDORF Electrical Co., 98 Warren St., Newark, N. J.

SWISS Magneto Co., 3027 S. Wabash ave., Chicago, Ill.

VELOS—See Philadelphia Timer & Machine Co.

MAGNETS

PERMANENT MAGNETS

(For Magnetos)

BOKER & Co., Hermann, 101 Duane St., New York, N. Y. (Importers.)

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. (See page 403.)

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.) (See page 379.)

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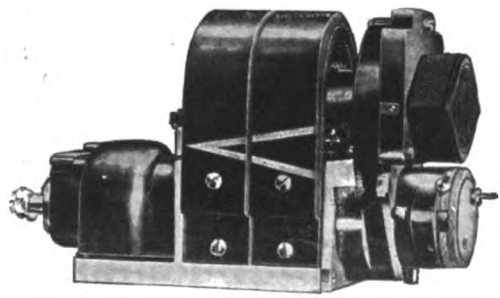

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MANIFOLDS

INTAKE AND EXHAUST MANIFOLDS

(Brazed and Welded Manifolds. For Cast Manifolds—See Castings)

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 333.)

AMERICAN Tube Bending Co., 5-9 Lawrence St., New Haven, Conn. (See page 267.)

BALTIMORE Tube Co., Baltimore, Md.

BRASS & Copper Products Co., 237-43 Chestnut St., Newark, N. J.

DETROIT Tube Products Co., 187-89 Junction Ave., Detroit, Mich. (See page 267.)

DIAMOND Mfg. Co., Detroit, Mich.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

NATIONAL Pipe Bending Co., River & Lloyd Sts., New Haven, Conn.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

STANDARD Metalwork Co., 22-40 Prospect St., Thompsonville, Conn.

STANDARD Tool & Mfg. Co., 72 Champlain St., Detroit, Mich.

STANDARD Welding Co., Cleveland, O. (See Book Mark.)

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I.

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 169.)

MANUFACTURERS AGENTS

(This is a list of Manufacturers Agents who advertise in this publication.)

FAW, J. H., 41 Warren St., New York, N. Y. (See page 585.)

HIBBARD Engineering Co., Detroit, Mich. (See page 569.)

HINCHMAN-BAKER Co., Free Press Bldg., Detroit, Mich. (See page 441.)

LOVELEY Sales Co., A. L., Union Trust Bldg., Detroit, Mich. (See page 405.)

O'HAGAN Sales Co., 604-05 Chamber of Commerce, Detroit, Mich. (See page 515.)

MAPS

ROAD MAPS

AUTOMOBILE Blue Book Publishing Co., 2160 Broadway, New York, N. Y.

BALDWIN Mfg. Co., 143 Federal St., Boston, Mass.

CALDWELL, Henry, 137 E. 16th St., New York, N. Y.

CHADWICK, L. S., 7309-609 Platt Ave., Cleveland, O.

CLASON Map Co., 1515 Tremont Pl., Denver, Colo.

FARMER & Co., Silas, 29-31 Monroe Ave., Detroit, Mich.

IOWA Publishing Co., Fifth St. & Grand Ave., Des Moines, Ia.

MENDENHALL, C. S., Race St., & Opera Pl., Cincinnati, O.

SCARBOROUGH Co., 338 N. Delaware Ave., Indianapolis, Ind.

WALKER Lithograph & Publishing Co., 400 Newbury St., Boston, Mass.

MATTING

ALUMINUM MATTING

ALUMINUM Co. of America, Pittsburg, Pa.

METALLIC Automobile Matting Co., Rochester, N. Y. "Pyrma." (See page 293.)

PYRMA—See Metallic Automobile Matting Co

MATS

COCOA MATS

DARRAGH & Small, 177 Water St., New York, N. Y.

HEYWOOD Bros. & Wakefield Co., 174 Portland St., Boston, Mass.

KEMPF & Bro., Geo. F., 1027 N. Fourth St., Philadelphia, Pa.

McCABE & Bro., Benj., 37 E. 18th St., New York, N. Y.

RANCOCAS Mills, Trenton, N. J.

RUBBER MATS

ACME Rubber Mfg. Co., Trenton, N. J.

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass. "Lenox," "Tiger."

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O. (See page 585.)

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

GOODRICH Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co., Trenton, N. J

HOME Tire Co., Trenton, N. J. (See page 419.)

LENOX—See Boston Woven Hose & Rubber Co.

MANHATTAN Rubber Mfg Co., Passaic, N. J

MATTSON Rubber Co., Lodi, N. J. (See page 419.)

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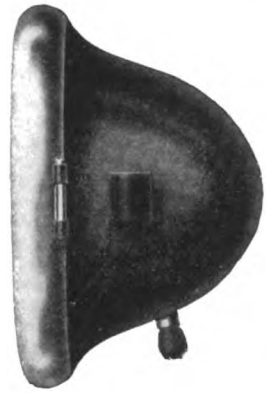

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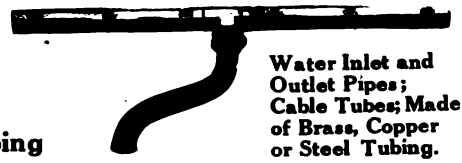

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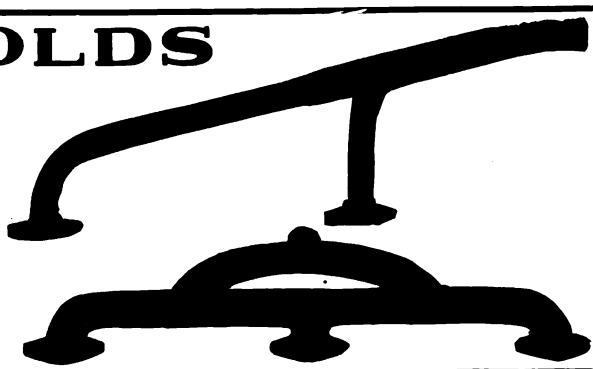
187-189 Junction Avenue DETROIT, MICH.

MANIFOLDS

made from Copper, Brass, or Steel. Seamless tubing in any form desired for Water Inlets and Outlets, Gas Intakes, also Exhaust.
Submit blue prints and specifications to us for prices before placing your order.



AM. TUBE BENDING CO., Inc.
5-7-9 Lawrence St.,
NEW HAVEN, CONN.

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MATS (Continued)

RUBBER MATS (Continued)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

MERCER Rubber Co., Hamilton Square, N. J.

MILFORD Rubber Works, Milford, Ill.

MINERALIZED Rubber Co., 165 Chambers St., New York, N. Y.

MONARCH Rubber & Oil Cloth Co., 41 N. Seventh St., Philadelphia, Pa.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa

THERMOID Rubber Co., Trenton, N. J. (See page 499.)

TIGER—See Boston Woven Hose & Rubber Co.

VICTOR Rubber Co., Springfield, O.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. (See page 371.)

WALPOLE Tire & Rubber Co., Walpole, Mass.

STEEL MATS

CARY Mfg. Co., 126 Nassau St., Brooklyn, N. Y.

WORTH Wire Works, Kokomo, Ind.

STEP OR RUNNING BOARD MATS

KAR KLEAN—See Specialty Mat Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y. (See page 309.)

SPECIALTY Mat Co., 1 First St., Troy N. Y "Kar Klean."

METALS

BEARING METALS

A. B. C. Castings Co., 6515 Carnegie Ave., S. E., Cleveland, O. "Meteor."

ACORN—See Cadman Mfg. Co.

ADAMANT—See Magnolia Metal Co.

ÆTNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

ALUMINUM Castings Co., Cleveland, O (See page 109.)

AMERICAN Bronze Co., 140-80 Non-Gran Blvd., Berwyn, Pa. "Non-Gran." (See page opposite inside front cover.)

AMERICAN Bronze Co., 1415 Niagara St., Buffalo, N. Y. "Grainless."

AMERICAN Manganese Bronze Co., 99 John St., New York, N. Y. "Spare's."

ATKINSON Co., Rochester, N. Y. "Superior," "Plata." (See page 271.)

AUTO-CRAT—See Syracuse Smelting Works

AZALEA—See Vanadium Metals Co.

BIRKENSTEIN & Sons, S., 387-99 W. Ontario St., Chicago, Ill. (See page 515.)

BLATCHFORD Co., E. W., 230 N. Clinton St., Chicago, Ill.

BRIDGEPORT—See Monumental Bronze Co.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O. (See page 111.)

CADMAN Mfg. Co., A. W., 2814-16 Smallman St., Pittsburg, Pa. "Acorn."

CLIMAX—See Enterprise Metal Co.

COLORADO Lead Works Co., 1516 Blake St., Denver, Colo.

COLUMBIA Smelting & Refining Works, 365-67 West St., New York, N. Y.

CONTINENTAL Metal Co., 68-70 Harrison St., Brooklyn, N. Y. "Premier."

CRAMP & Sons Ship & Engine Building Co., William, Philadelphia, Pa. "Parsons." (See page 269.)

D & M—See De Freville & Masset.

DAMASCUS Bronze Co., Pittsburg, Pa.

DAWSON Hardened Copper Co., S. R., 42 Broadway, New York, N. Y.

DE FREVILLE & Masset, 60 Elm St., Newark, N. J. "D & M."

EDNA Brass Mfg. Co., 525-33 Reading Rd., Cincinnati, O.

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y. (See page 507.)

ELEPHANT—See Phosphor Bronze Smelting Co.

EMPIRE Metal Co., Syracuse, N. Y. "Premier," "Triumph."

ENTERPRISE Metal Co., Union Bldg., Syracuse, N. Y. "Climax," "Vanadium."

EUREKA Brass Co., 2210-18 Scott Ave., St. Louis, Mo

EUREKA Co., North East, Pa. (See page 273.)

FAHRIG Metal Co., 34 Commerce St., New York, N. Y.

FORT Hill Bronze Mfg Co., 48-56 Waters Ave., West Everett, Mass.

FRICTIONLESS Bushing Co., 312 W. 43d St., New York, N. Y.

FRICTIONLESS Metal Co., Chattanooga, Tenn.

GARDINER Metal Co., 1356-64 W. Lake St., Chicago, Ill.

GENERAL Aluminum & Brass Mfg. Co., E. Grand Blvd. & St. Aubin Ave., Detroit, Mich. (See pages 181 and 271.)

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn. (See page 343.)

GRAINLESS—See American Bronze Co.

GREAT Western Smelting & Refining Co., 41st & Wallace Sts., Chicago, Ill.

HECLA—See Paulson & Son.

HARPER, Thomas, 139 Lafayette St., New York, N. Y. "Hi-Servis."

HI-SERVIS—See Harper, Thomas

HOWARD Metal Co., Second & Canal Sts., Reading, Pa.

HOYT Metal Co., 700 Merchants Laclede Bldg., St. Louis, Mo. "Trojan." (See page 271.)

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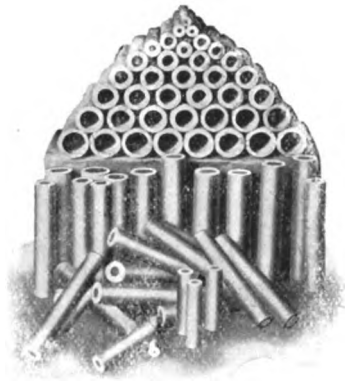
CORED BARS FOR BUSHINGS



PARSONS' WHITE BRASS for main engine and crank pin bearings. CRAMP'S SPECIAL BEARING BRONZE for wrist pin, cam-shaft, transmission bearings, valve stem guides and similar bearings.

List of cored and solid cast bars of our bearing metals in stock:

Number.	Outside Diameter. Inches.	Inside Diameter. Inches.	Length. Inches.
1	1	½	6
2	1¼	½	6
3	1½	¾	6
4	1½	¾	12
5	1¾	1	12
6	2	1	12
7	2	1¼	12
8	2¼	1	12
9	2¼	1¼	12
10	2½	1½	12
11	2½	1½	12
12	2¾	1½	12
13	2¾	1¾	12
14	3	2	12
15	3	2¼	12
16	3¼	2¼	12
17	3¼	2½	12

Solid bars up to 2 inches diameter.

Furnished either in PARSONS' WHITE BRASS or CRAMP'S SPECIAL BEARING BRONZE. Sizes of bars not shown in the list and cored whole and half bushings with end collars can be furnished from stock patterns. In ordering refer to the number in first column.

THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING CO.
PHILADELPHIA, PA.

"HECLA" BRONZE

ANTI-FRICTION

A bearing Bronze which DOES NOT CUT

Cored Bars and *Solid Rods* in a variety of sizes suited to the requirements of the repair shop and manufacturer.

"HECLA" BRONZE possesses those properties so essential to a metal used for bearing purposes.

It DOES NOT CUT **It will not POUND OUT or BREAK**
It machines at a LOW COST

Bearings of this material have a reputation for long life and freedom from friction. The convenient form in which it is stocked appeals to the repairman.

"HECLA" BRONZE is not the lowest priced bearing bronze and there are other bronzes priced much higher. Irrespective of price per pound, you will find this material the most economical, all points considered.

The composition of this bronze is UNIFORM at all times. Only the best materials are used in producing the alloy.

We make the claim emphatically, that "HECLA" BRONZE has *no superior*, regardless of price.

Castings and *machined parts* will be furnished from your patterns or sketches.

THOMAS PAULSON & SON, Inc.
97 Second Ave. **Brooklyn, N. Y.**

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METALS (Continued)

BEARING METALS (Continued)

KAHN Bros., 775-97 Humboldt St., Brooklyn, N. Y.

LEHMAN Bros., 401-05 Jefferson St., Hoboken, N. J.

LIGHT Mfg. & Foundry Co., Pottstown, Pa.
(See page 147.)

LISSBERGER & Son, Marks, 281 Borden Ave., Long Island City, N. Y.

LITTAND Mfg. Co., Kenosha, Wis.

LUMEN Bearing Co., Buffalo, N. Y.
(See page 321.)

MAGNOLIA Metal Co., 113-15 Bank St., New York, N. Y. "Adamant."

MERCHANT & Evans Co., Philadelphia, Pa. "S. A. E."
(See page 135.)

METEOR—See A. B. C. Castings Co.

MOGUL Metal Co., Detroit, Mich.
(See page 125.)

MONUMENTAL Bronze Co., Bridgeport, Conn. "Bridgeport."

MORE-JONES Brass & Metal Co., 3132-44 N. Broadway, St. Louis, Mo.

MURPHY Metal Co., 46th St. & Rock Island Tracks, Chicago, Ill.

MURPHY-POTTER Co., Detroit, Mich.

MUZZY-LYON Co., Detroit, Mich.
(See page 125.)

NATIONAL Lead Co., New York, N. Y.
(See page 291.)

NEW Era Mfg. Co., Kalamazoo, Mich.

NON-GRAN—See American Bronze Co.

NORTH American Smelting Co., Ninth & Thompson Sts., Philadelphia, Pa. "Vulcan." "Philadelphia."

PALMETTO Metal Co., Old Colony Bldg., Chicago, Ill.

PARSONS—See Cramp & Sons.

PAULSON & Son, Thomas, 97 Second Ave., Brooklyn, N. Y. "Hecla."
(See page 269.)

PHILADELPHIA — See North American Smelting Co.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant."
(See page 549.)

PIONEER Brass Works, Indianapolis, Ind.
(See page 113.)

PITTSBURGH White Metal Co., Diamond Bank Bldg., Pittsburgh, Pa.

PLATA—See Atkinson Co.

PREMIER—See Continental Metal Co.

PREMIER—See Empire Metal Co.

REEVES & Co., Paul S., 1415-25 Catharine St., Philadelphia, Pa.

S. A. E.—See Merchant & Evans Co.

SANFORD Co., David C., 33-39 Tulip St., Bridgeport, Conn.

SEMPER IDEM—See Wildes Sons, Thomas.

SHONBERG, I., 122 Flushing Ave., Brooklyn, N. Y.

SPARE'S—See American Manganese Bronze Co.

STANLEY—See Syracuse Smelting Works.

SUPERIOR—See Atkinson Co.

SYRACUSE Smelting Works, Drawer 48, Station G, Brooklyn, N. Y. "Auto-Crat," "Stanley."
(See page 562.)

TRIUMPH—See Empire Metal Co.

TROJAN—See Hoyt Metal Co.

UNITED Foundry & Machine Co., Bridgeport, Conn.
(See page 341.)

U. S. Reduction Co., Manhattan Bldg., Chicago, Ill.

VANADIUM—See Enterprise Metal Co.

VANADIUM Metals Co., Vanadium Bldg., Pittsburgh, Pa. "Azalea."
(See page 499.)

VULCAN—See North American Smelting Co.

WAMBOLD Mfg. Co., 3011 Lisbon Ave., Milwaukee, Wis.
(See page 303.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.)
(See page 271.)

WILDES Sons, Thomas, 14 Dover St., New York, N. Y. "Semper Idem."

WILLIAMS & Son, E. A., Jersey City, N. J.

WING & Co., J. T., 15-19 Woodward Ave., Detroit, Mich.

ZENITE Metal Co., 518 N. Capitol Ave., Indianapolis, Ind.

PERFORATED METALS

CHICAGO Perforating Co., 2445 W. 24th Pl., Chicago, Ill.

CLINTON Wire Cloth Co., Clinton, Mass.

ERDLE Perforating Co., 7 Factory St., Rochester, N. Y.

HARRINGTON & King Perforating Co., 632 N. Union St., Chicago, Ill.

HENDRICK Mfg. Co., Carbondale, Pa.

MANHATTAN Perforated Metal Co., 237-39 Centre St., New York, N. Y.

MUNDT & Sons, Chas., 53-57 Fairmount Ave., Jersey City, N. J.

NORTMANN-DUFFKE Foundry Co., 27th Ave. & N. W. R. R., Milwaukee, Wis.

METERS

COMPRESSION METERS

(See Gauges, Cylinder Compression)

DISTANCE RECORDING METERS OR ODOMETERS

(For combined Odometers and Speedometers—See Speedometers)

BAUMGAERTNER, F., 2344 E. 105th St., Cleveland, O. "Coronet."

CORONET—See Baumgaertner, F.

JONES Speedometer Co., Bush Terminal, Brooklyn, N. Y.

STAR Speedometer Co., Milton, Pa.

TRANSIMETER Co., 20 Fulton St., New York, N. Y.

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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Die Castings

The dependable kind
Made from White Metal Alloys

Accurate—Dense and True to Specifications

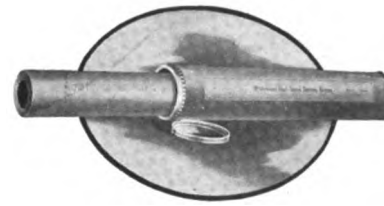
Let us have your prints for estimate. We shall be glad to recommend an alloy suitable for your purpose and give you the benefit of the knowledge gained during our thirty-five years in the mixed metal business.

HOYT METAL COMPANY

Largest manufacturers of White Metal Alloys in the World

700 Merchants-Laclede Bldg., St. Louis
111 Broadway, New York
1205 Westminster Bldg., Chicago
308 Moffatt Bldg., Detroit
Eastern and Lewis Sts., Toronto

Whitehouse High Speed Bearing Bronze



Will not flake under frictional stress

All sizes carried in stock

E. A. WHITEHOUSE MFG. CO.

42-54 Elm St., Newark, N. J.

GENERAL ALUMINUM AND BRASS MANUFACTURING COMPANY

BEARINGS

Manufacturers of the well-known Bronze Back Babbitt Lined (not die cast) automobile bearings. Designed also for electric motors and machine tools. Ask for copy of test of our bearings made by one of the leading automobile manufacturers on 32 h.p. motor running without lubrication under full load for 23 hrs. 35 min. An efficient engineering force for advice and design is at your disposal.

Plant No. 1
E. Grand Blv'd and St. Aubin Ave.

Plant No. 2
184 Brush Street

DETROIT

SAMSON

MANGANESE BRONZE

Highest Tensile Strength — Ingot or Castings

THE ATKINSON CO.

Successors to Clum & Atkinson — **ROCHESTER, N. Y.**

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METERS (Continued)

GASOLINE METERS

NEPTUNE Meter Co., 90 West St., New York, N. Y. "Trident."

TRIDENT—See Neptune Meter Co.

GRADE METERS

ADAMS Co., Dubuque, Ia. "Gradometer."

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

AUTOCRAT—See American Thermo Ware Co.

GRADOMETER—See Adams Co.

HEAT INDICATING METERS

(For attachment to radiator to show temperature of cooling water)

BOYCE MOTOMETER—See Motometer Co.

MOTOMETER Co., 1790 Broadway, New York, N. Y. "Boyce Motometer." (See page 529.)

SPEED METERS

(See Speedometers)

TAXI METERS

(See Taximeters)

MICA

AMERICAN Mica Co., Newton Lower Falls, Mass.

ASHEVILLE Mica Co., Asheville, N. C.

CHICAGO Mica Co., Valparaiso, Ind.

DIELECTRIC Mfg. Co., 224 S. Vandeventer Ave., St. Louis, Mo.

GRANITE State Mica Co., Old South Bldg., Boston, Mass.

MICA Mfg. Co., 150-52 Chambers St., New York, N. Y.

MUNSELL & Co., Eugene, 68 Church St., New York, N. Y.

NEW York Mica & Mfg. Co., Auburn, N. Y.

PRESTON Co., Robert K., Monadnock Bldg., Chicago, Ill. "Prestonite."

PRESTONITE—See Preston Co.

SCHOONMAKER Co., A. O., 88 Park Pl., New York, N. Y.

SNOW FLAKE—See Western Mica Mining & Milling Co.

TAR Heel Mica Co., Plumtree, N. C.

UNITED Mica Co., Grafton Center, N. H.

WATSON Bros., 170 Purchase St., Boston Mass.

WESTERN Mica Mining & Milling Co., W. 16th Ave. & Bryant St., Denver, Colo. "Snow Flake."

MIRRORS

ADJUSTABLE DASHBOARD MIRRORS

(To enable driver to see to the rear of the car)

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y. "Mirrorscope."

AMERICAN Lamp Works, 253 W. 47th St., New York, N. Y. "Liberty."

AMERICAN Thermo Ware Co., 16 Warren St., New York, N. Y. (Importers.) "Autocrat."

ANSONIA Mfg. Co., Ansonia, Conn.

ARGOS—See Motor Car Equipment Co.

ATLAS—See Toffler Co.

AUTOCRAT—See American Thermo Ware Co.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BELLAMY—See Novelty Mfg. Co.

COX Brass Mfg. Co., Albany, N. Y. "Reflectorscope." (See page 467.)

FRANCO Mfg. Co., 119-21 E. 16th St., Chicago, Ill.

GOODWIN & Kintz Co., Winsted, Conn.

HOCO—See Hoeft & Co.

HOEFT & Co., Ashland Ave. & Kinzie St., Chicago, Ill. "Hoco."

HOLT & Beebee Co., 51 Chardon St., Boston Mass.

HUDSON Auto Lamp Works, 1648-50 Broadway, New York, N. Y.

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

LIBERTY—See American Lamp Works.

MIRRORSCOPE—See Alexander Mfg. Co.

MOTOR Car Equipment Co., 55 Warren St., New York, N. Y. (Importers.) "Argos."

NOVELTY Mfg. Co., Waterbury, Conn. "Bellamy." (See page 495.)

REFLECTORSCOPE—See Cox Brass Mfg. Co.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

SMITH Co., H. Lund, 201 Paterson Ave., Paterson, N. J.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y. "Atlas."

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J. (See page 271.)

WATER GAUGE MIRRORS

KNOX Co., Frank J., Hartford, Conn.

MIXERS

FUEL MIXERS, ECONOMIZERS OR AGITATORS

AERO-MATIK Gas Saver Co., 907 N. Broad St., Philadelphia, Pa.

AMERICAN Compensating Valve Co., 630 18th St., Manitowoc, Wis.

Complete Index to Classification appears on Pages 8 to 22.

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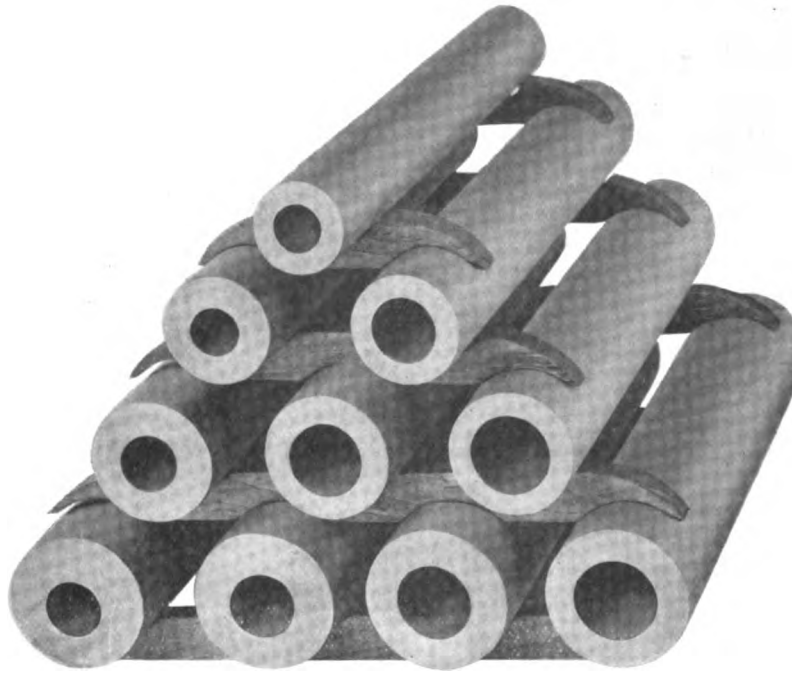
Eureka Cored and Solid Bars

PHOSPHOR BRONZE BUSHINGS



The sizes most commonly used are:

O. D. Inches	I. D. Inches	Average Wt. Lbs.
3/4	Solid	1 3/4
1	1/2	2 1/4
1 1/4	5/8	3 1/2
1 3/8	3/4	4
1 1/2	3/4	5
1 5/8	7/8	5 1/2
1 3/4	1	6 1/4
2	1 1/8	8 1/4
2 1/4	1 3/8	10
2 1/2	1 5/8	11

We furnish Solid Bars of any diameter and Cored Bars of any size without additional charge for Patterns.

The durability and antifriction qualities of Eureka Bronze are unexcelled. It is the most successful metal for bearing purposes on the market, giving the greatest resistance to wear, and the least amount of friction. It increases the efficiency and life of the bearings.

THE EUREKA COMPANY, North East, Penn'a.

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MIXERS (Continued)

FULL MIXERS, ECONOMIZERS OR AGITATORS (Continued)

AUTOMATIC Device Co., 551 E. Jefferson St., Frankfort, Ind. "Economy."

AUTOMIZER Co., City Natl. Bank Bldg., Canton, O.

BEITMAN & Co., I. B., Security Bldg., Chicago, Ill.

BINGHAM Mfg. Co., 227 Prospect Ave., N. W., Cleveland, O. "G. L."

BREMER-WILSON Mfg. Co., 1421 Michigan Ave., Chicago, Ill. "Triplex."

BROWN-TAYLOR-GREENE Co., 1323-25 S. Michigan Ave., Chicago, Ill. "Empire." (See page 483.)

BUSHEY, E. J., 1790 Broadway, New York, N. Y.

CRARY Co., 650-52 Woodward Ave., Detroit, Mich.

CRONE, F. G., 334 Genesee St., Buffalo, N. Y.

DEPPE, W. P., 127 Duane St., New York, N. Y. "Stanley."

DICKY—See Economic Specialties Co.

DOXAMETER Co., 2132 Michigan Ave., Chicago, Ill.

E. S.—See Scudder & Co.

EASY Starter & Speeder Co., Jenkins Arcade Bldg., Pittsburg, Pa.

ECONOMIC Specialties Co., 1712 Michigan Ave., Chicago, Ill. "Dicky."

ECONOMY—See Automatic Device Co.

ECONOMY Gas Vaporizer Co., 2 Main St., Adrian, Mich.

EGYPTIAN—See Loose Mixing Chamber Co.

EMPIRE—See Brown-Taylor-Greene Co.

FUDGE Bros. Mfg. Co., Marion, Ind. "Go."

G. L.—See Bingham Mfg. Co.

GAS Saver Sales Co., 1790 Broadway, New York, N. Y. "Gasosava."

GAS Saving & Back-Fire Preventer Co., 125 E. 23d St., New York, N. Y. (See page 537.)

GASIFTER—See Toledo Auto Devices Co.

GASOSAVA—See Gas Saver Sales Co.

GO—See Fudge Bros. Mfg. Co.

GYREX—See Royal Equipment Co.

JEWELL Auto Devices Co., Frankfort, Ind.

JOHNSON Economizer Co., Henry B., 1433 Spring Garden St., Philadelphia, Pa.

KERO-MIX—See Patterson, F. W.

KERNODLE-M'DANIEL Co., Frankfort, Ind.

LOOSE Mixing Chamber Co., R. D., 110½ N. Fifth St., Springfield, Ill. "Egyptian."

LYDON Mfg. Co., 1514 Michigan Ave., Chicago, Ill. "Speedler."

M & M—See Moller Bros. Controller & Economizer Co.

MARTIN Shock Absorber Co., Hooper & Slauson Aves., Los Angeles, Cal.

MICHENER, E. S., 80 Washington St., New Castle, Pa.

MOLLER Bros. Controller & Economizer Co., Betz Bldg., Philadelphia, Pa. "M & M."

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y. "Nyco."

NYCO—See New York Coil Co.

OATHOUT, Chas. M., Saugerties, N. Y.

PARKER Mfg. Co., Philadelphia, Pa.

PATTERSON, F. W., 836 E. 43d St., Chicago, Ill. "Kero-mix."

PECK, E. C., 432 Third St., San Bernardino, Cal.

PROGRESSIVE Mfg. Co., 468 64th Ave. (W. Allis), Milwaukee, Wis.

RAIMES & Co., 50 Ferry St., New York, N. Y. "Spider."

ROYAL Equipment Co., 1372 Bostwick Ave., Bridgeport, Conn. "Gyrex." (See page 95.)

ROYAL-SILENT Motor Co., Los Angeles, Cal.

S. K. P. Mfg. Co., Pittsburg, Pa.

SAUNDERS Co., Leslie R., 1250-60 W. Seventh St., Los Angeles, Cal.

SCUDDER & Co., E. T., 2010 Broadway, New York, N. Y. "E. S."

SIRENO Co., 18-20 Rose St., New York, N. Y. "Votex."

SPEEDLER—See Lydon Mfg. Co.

SPIDER—See Raimes & Co.,

STANLEY—See Deppe, W. P.

STEWART Machine Works, Alfred C., 1008 Santee St., Los Angeles, Cal.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "Gasifter."

TRIPLEX—See Bremer-Wilson Mfg. Co.

VOTEX—See Sireno Co.

WILSON Vaporizer Co., Roslyn, Pa.

MOISTENERS

AIR OR MIXTURE MOISTENERS

(For feeding water into the intake manifold)

BALZER & Son, Andover, N. J. "Powac."

POWAC—See Balzer & Son.

SHUMAKER Motor Car Co., J. T., Rochester, N. Y.

MONOGRAMS

ORNAMENTAL METAL MONOGRAMS

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BERNARD Co., J., 422-30 E. 53d St., New York, N. Y.

CHILDS & Co., S. D., 279 E. Monroe St., Chicago, Ill.

COLGAN Co., J. W., Sudbury Bldg., Boston, Mass.

CREUTZ Plating Co., Cincinnati, O.

CROWE Name Plate & Engraving Co., Chicago, Ill. (See page 307.)

ETCHING Company of America, 2526-28 W. Congress St., Chicago, Ill.

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

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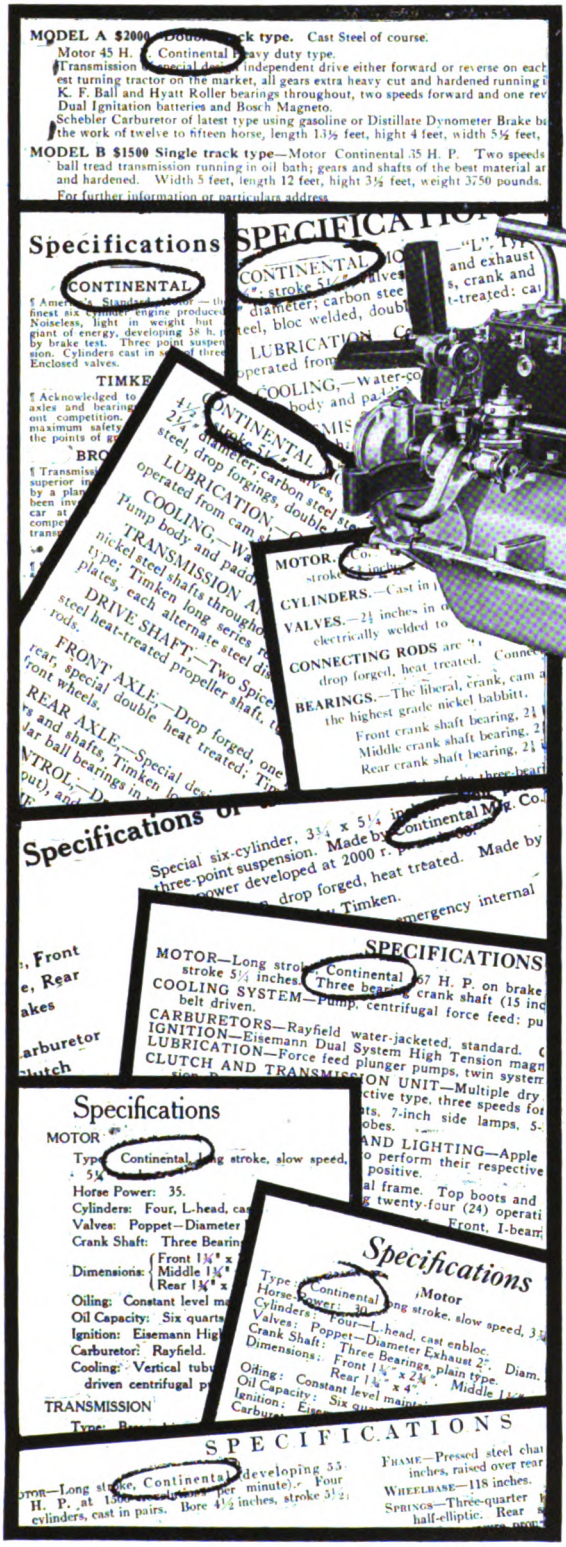

First in the Specifications

Continental Motors

The first thing—the really big thing—is the Motor. It stands for five out of seven of the good qualities for which any car or truck is selected:

- Power
- Speed
- Endurance
- Economy
- Flexibility
- Appearance
- Simplicity

For such an overwhelming reason the motor, ninety-nine times out of a hundred, comes first in the specifications. It really establishes the standing of a motor vehicle.

And during 1914, fully forty thousand men will buy motor vehicles largely because they are Continental equipped.

The current of public opinion is running mighty strong.

"Continental Motor" to head a list of specifications is an asset of good-will almost beyond price.

Add this asset to your product and watch the sales jump.

Continental Motor Mfg. Co.

DETROIT, MICH.

Factories: DETROIT, MUSKEGON

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MONOGRAMS (Continued)

ORNAMENTAL METAL MONOGRAMS (Continued)

GRAMMES & Sons, L. F., Jordan & Union Sts., Allentown, Pa.

GREENDUCK Co., 2127 Van Buren Pl., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANDEL Co., Louis, 138 Center St., New York, N. Y.

HANSON, C. H., 178 N. Clark St., Chicago, Ill.

HICKOK Mfg. Co., 38 St. Paul St., Rochester, N. Y.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

JOHNSTON Co., J. G., 79 Sudbury St., Boston, Mass.

MATTHEWS & Co., Jas. H. (Forbes Field), Pittsburg, Pa.

MURDOCK, Jr. Co., James, 116 Opera Pl., Cincinnati, O.

NEW YORK Stencil Works, 100 Nassau St., New York, N. Y.

REES, F. H., Granite Bldg., Rochester, N. Y.

RIKER Co., 480 Washington St., Newark, N. J.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

SALMAN, John A., 17-21 Bromfield St., Boston, Mass.

SCHRIDDE, Wm., 35 S. Clark St., Chicago, Ill.

SCHWERDTLE Stamp Co., 39-41 Cannon St., Bridgeport, Conn.

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

WALTER & Sons, N. C., 3 Park Row, New York, N. Y.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

MOTORS

ELECTRIC AUTOMOBILE MOTORS

DIEHL Mfg. Co., Elizabethport, N. J.
(See page 453.)

GENERAL Electric Co., Schenectady, N. Y.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg) Pittsburg, Pa.

GASOLINE AUTOMOBILE MOTORS

ADVANCE Power Co., 517 Aldine Pl., Chicago, Ill.

AMERICAN & British Mfg. Co., 718 Crescent Ave., Bridgeport, Conn.

AUTOPARTS Mfg. Co., Dept. 1, Detroit, Mich.
(See page 379.)

BEAVER Mfg. Co., 789 Chase St., Milwaukee, Wis.
(See pages 278 and 279.)

BINSSE Machine Co., Harrison, N. J. "Howard."

BRENNAN Motor Co., 105 Grape St., Syracuse, N. Y.

BUDA Co., Harvey, Ill.
(See page 377.)

CHRISTENSEN Engineering Co., 841-47 30th St., Milwaukee, Wis.

CLARK Motor Co., E. C., E. LeRoy St., Jackson, Mich.

CONTINENTAL Motor Mfg. Co., Detroit, Mich.
(See page 275.)

CRESCENT Motor Co., Cincinnati, O.
(See page 51.)

CROSS Gear & Engine Co., Detroit, Mich.
(See page 553.)

DART Motor Mfg. Co., Waterloo, Ia.

DAVIS Mfg. Co., 15th Ave. & Park St., Milwaukee, Wis.
(See page 289.)

DICE Engine Co., 50 W. 16th St., Anderson, Ind.

ERGON—See Hazard Motor Mfg. Co.

FAIRBURY Motor Car Works, Main & Sixth Sts., Fairbury, Ill.

FALLS Machine Co., Sheboygan Falls, Wis.

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich.
(See page 281.)

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRISBIE Motor Co., 56 College St., Middletown, Conn.

GOLDEN, Belknap & Swartz Co., 1248 Grand River Ave., Detroit, Mich.

HAZARD Motor Mfg. Co., Rochester, N. Y. "Ergon."
(See page 517.)

HERSCHELL-SPILLMAN Co., North Tonawanda, N. Y.
(See page 303.)

HOOSIER Motor Co., Goshen, Ind.
(See page 567.)

HOOVEN, Owens, Rentschler Co., Hamilton, O.

HOWARD—See Binsse Machine Co.

JENCICK Motor Corp., Port Chester, N. Y.
(See page 293.)

KIRKHAM Motor Mfg. Co., Williams St. E., Bath, N. Y.

LIGHT Inspection Car Co., Hagerstown, Ind. "Teetor."

LYCOMING Foundry & Machine Co., Williamsport, Pa.
(See page 445.)

LYONS-ATLAS Co., Indianapolis, Ind.
(See page 35.)

McINTYRE Mfg. Co., 172-82 W. Locust St., Columbus, O.

METAL Products Co., Decatur, Ind.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MODEL Gas Engine Works, Peru, Ind.
(See page 377.)

MONARCH Motor Mfg. Co., 3145-53 N. Halsted St., Chicago, Ill.

NORTHWAY Motor & Mfg. Co., 510-14 Maybury Grand Ave., Detroit, Mich.

OULTON Motor & Mfg. Co., 311 Atlantic Ave., Boston, Mass.

PALMER-MOORE Co., 100 N. Geddes St., Syracuse, N. Y.

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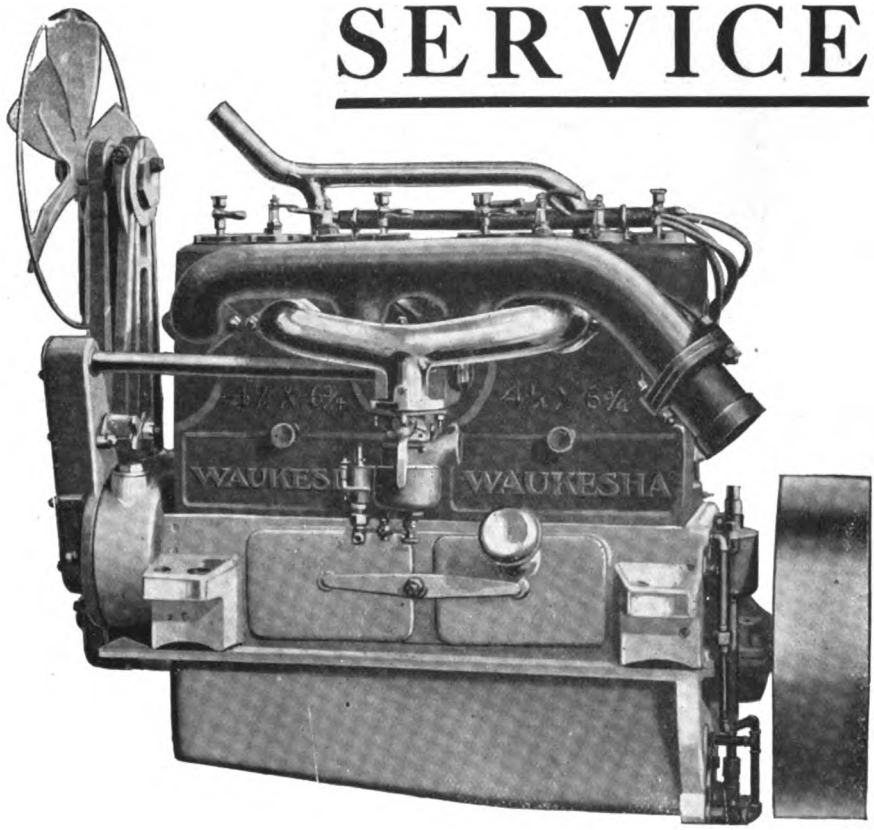
WAUKESHA

SERVICE



Stop and think before you adopt a motor. Waukesha Service means this.

Your customers will have small repair bills. Our repair business is 8% of our whole business. Replacement on our guarantee is only ½ of 1 per cent. Shipment of repairs for over two years indicate the following facts,—

80% of all repair orders shipped same day received. 15% on second day.

5% thereafter, for various reasons.

Waukesha Motors are not sold at cost price to foster a large future repair business.

You pay an honest price for your motor and that ends your expense.

Compare these fundamental facts with others before you buy.

Waukesha Motors manufactured in these sizes:

3¾ x 5¾	4½ x 5¾	4½ x 6¾
4¼ x 5¾	4¼ x 6¾	4¾ x 6¾

WAUKESHA MOTOR CO.

WAUKESHA WISCONSIN

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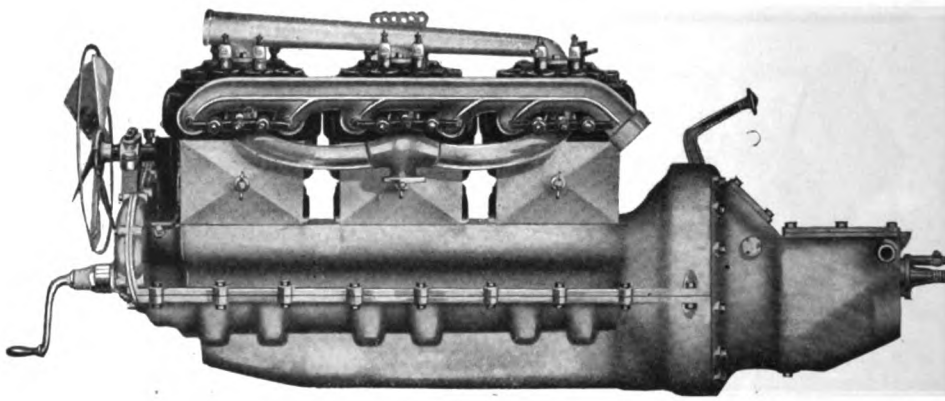
Beaver Unit Power Plants



Beaver "Six"

40-45 H. P.

3¾ x 5 inch cylinders

Large Valves Enclosed Action

A Perfected Product.

Years of experience and unexcelled facilities unite to make the Beaver Six Unit the premier motor of the year.

Notice its beautiful compactness—a silent, efficient power unit that represents every refinement we know how to put into a motor.

Three-point suspension, large valves with enclosed action, circulating oil system, three-speed transmission and other features your car ought to offer.

Write us for detailed specifications

BEAVER MANUFACTURING COMPANY

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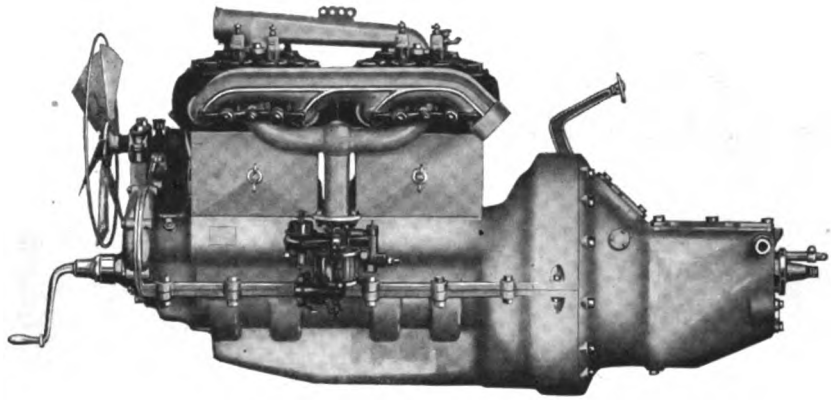
Beaver Unit Power Plants



Light trucks are being refined as never before. Careful buyers are demanding four-cylinder unit power plants permitting instant removability.

That is what this Beaver "Four" Unit Power Plant offers for trucks of 3/4 to 1½ tons capacity. In liberal dimensions that insure long life under severe service this power unit is unequaled.

Other types of Beaver Motors 2, 4 and 6 cylinder for all purposes.

Beaver "Four"

28-30 H. P.

3¾ x 5 inch cylinders

Large Valves Enclosed Action

2502 1st Ave., MILWAUKEE, WISCONSIN

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MOTORS (Continued)

GASOLINE AUTOMOBILE MOTORS (Continued)

PENINSULAR Auto Parts Co., 46 Champlain St., Detroit, Mich.

PORT HURON Construction Co., Port Huron, Mich.

REGAL Gasoline Engine Co., Coldwater, Mich.

ROBERTS Motor Co., 1435 Columbus Ave., Sandusky, O.

ROCHESTER Motors Co., 5 Wren St., Rochester, N. Y.

ROCKEFELLER Engine Co., Central Ave. & E. 65th St., Cleveland, O.

RUTENBER Motor Co., Marion, Ind. (See page 285.)

SCHLOSSER Mfg. Co., 151 E. 126th St., New York, N. Y.

SOMMER Motor Co., Bucyrus, O.

TEETOR—See Light Inspection Car Co.

TREBERT Engine Works, H. L. F., 495 St. Paul St., Rochester, N. Y.

WAMBOLD Mfg. Co., 3011 Lisbon Ave., Milwaukee, Wis. (See page 303.)

WARNER-DETROIT Motor Works, Dime Savings Bank Bldg., Detroit, Mich.

WARNER Mfg. Co., Toledo, O. (See page 481.)

WAUKESHA Motor Co., Waukesha, Wis. (See page 277.)

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

WISCONSIN Motor Mfg. Co., Dept. 27, Milwaukee, Wis. (See page 523.)

YALE Steel Stamping Co., Oostburg, Wis.

GASOLINE CYCLECAR MOTORS

DE LUXE—See Spacke Machine Co.

FARMER Mfg. Co., Fordyce & Marston Sts., Detroit, Mich. (See page 281.)

KEMP Machine Works, 1215 S. Franklin St., Muncie, Ind.

KIRKHAM Motor Mfg. Co., Williams St., E., Bath, N. Y.

MACK—See Universal Machinery Co.

REX Motor Co., Labadie St. (Ford City), Wyandotte, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind. "De Luxe." (See page 305.)

UNIVERSAL Machinery Co., 1916 St. Paul Ave., Milwaukee, Wis. "Mack."

WIZARD Motor Co., Indianapolis, Ind.

STEAM AUTOMOBILE MOTORS

(See Engines, Steam)

MOULDING

BRASS MOULDING

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 329.)

COWLES & Co., C., New Haven, Conn. (See page 177.)

DOUGLAS & Lomason Co., Detroit, Mich.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

JONAH & George, Merrimac, Mass.

KINSEY Mfg. Co., Toledo, O. (See page 153.)

MANHATTAN Brass Co., 328 E. 28th St., New York, N. Y.

METAL Stamping Co., 18th St. & Boulevard, Long Island City, N. Y.

MURPHY Co., G. W. J., Merrimac, Mass.

RANDOLPH-CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

WHITE Mfg. Co., Bridgeport, Conn.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

RUNNING BOARD MOULDING

(See also Moulding, Brass; also Moulding, Steel)

ALITE—See Zenite Metal Co.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 329.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

METALLIC Automobile Matting Co., Rochester, N. Y. (See page 293.)

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

WATERBURY Brass Goods Corp., 160 Washington Ave., Waterbury, Conn.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

ZENITE Metal Co., 518 N. Capitol Ave., Indianapolis, Ind. "Alite."

STEEL MOULDING

DAHLSTROM Metallic Door Co., 36 Blackstone Ave., Jamestown, N. Y.

MUFFLERS

EXHAUST MUFFLERS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 333.)

ANTI-EXPLO—See Garage Equipment Mfg. Co.

ATLAS Stamping Co., 557-61 Jackson Blvd., Chicago, Ill.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

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The Farmer is the Highest Type Cyclecar Engine

NO longer is the cyclecar considered a fad—**it is a fact.** It has come to stay; and the demand is obvious. Those manufacturers who would reap the benefit of this and secure the appreciation of knowing cyclecar buyers, will equip their machines with the

Farmer Engine

Type A motor has been designed for cyclecars and very small cars. Much thought has been given this motor in making it adaptable to the different requirements of chassis design. This 18 H.P. engine may be had as an open motor with or without cone clutch or with coupling for friction drive, and as a unit power plant with cone clutch with three speed and reverse transmission completely housed.

Stroke-bore ratio is 1.45. Experience has proved this is most satisfactory for small car work.

Cylinders and crank-case in the FARMER ENGINE are cast en bloc with integral intake and exhaust manifolds of easy sweep and large area.

Crankshaft is of two-bearing type with 1½ inch main journals and 1⅜ inch crank pins. This shaft is exceedingly stiff and rigid; it is given a scientific double heat treatment. The grey iron pistons are fitted with 3/16 inch rings and weigh but one pound, one ounce; but neither length nor strength has been sacrificed to obtain this weight.

The FARMER ENGINE ignition is obtained by low tension magneto or by timer. Every feature of this engine is made as perfect as skilled designing and expert workmanship can produce.

The FARMER ENGINE in power, smoothness of operation, length of time and economical fuel consumption is all that can be desired.

Write for complete information.

Farmer Manufacturing Co.

Fordyce & Marston Sts.

Detroit, Mich.

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MUFFLERS (Continued)

EXHAUST MUFFLERS (Continued)

BRISCOE Mfg. Co., Detroit, Mich.

BYRNE, Kingston & Co., 1040 Webster St., Kokomo, Ind. "Kingston."

EJECTOR—See Motor & Mfg. Works Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Anti-Explo," "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich.

HAYES Mfg. Co., Detroit, Mich. (See pages 78 and 79.)

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y. (See page 213.)

KINGSTON—See Byrne, Kingston & Co.

KINSEY Mfg. Co., Toledo, O. "Kinwood." (See page 153.)

KINWOOD—See Kinsey Mfg. Co.

LAWSON Co., F. H., Cincinnati, O.

MAXIM Silencer Co., 60 Huyshope Ave., Hartford, Conn.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium." (See page 507.)

MOTOR & Mfg. Works Co., Dunkirk, N. Y. "Ejector." (See page 219.)

OLDBERG Mfg. Co., Detroit, Mich. (See inside back cover.)

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y. (See page 453.)

RADIUM—See Milwaukee Auto Specialty Co.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

TROIKE Muffler & Mfg. Co., Lorain, O.

XARDELL Bros. Co., 28 Broadway, Utica, N. Y.

YANKEE Co., Utica, N. Y. (See page 581.)

THROAT MUFFLERS

BRADLEY Knitting Co., Delavan, Wis.

SCOTT Knitting Co., 1021 Gallia St., Portsmouth, O.

WAY Muffler Co., 23d & Arch Sts., Philadelphia, Pa.

NAILS

UPHOLSTERY NAILS

(See Tacks, Upholstery)

NIPPLES

PIPE NIPPLES

(See Fittings, Pipe)

PUMP NIPPLES

(See Connections, Tire Pump)

NUMBERS

LAMP NUMBERS

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

LICENSE NUMBERS OR HANGERS

(For License Holders—See Holders, License)

ALUMINUM Goods Mfg. Co., Manitowoc, Wis.

BALTIMORE Enamel & Novelty Co., ft. Allen St., Baltimore, Md.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

BLISS Mfg. Co., E. C., 84 Chestnut St., North Attleboro, Mass. (See page 505.)

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

FINE Co., Horace E., 19 E. State St., Trenton, N. J.

INGRAM-RICHARDSON Mfg. Co., Beaver Falls, Pa.

LIMERICK Co., J. Arthur, Howard St. & Park Ave., Baltimore, Md.

MULHAUPT, F. Jos., 227 N. Fifth St., La Fayette, Ind.

MURDOCK, Jr. Co., Jas., 116 Opera Pl., Cincinnati, O.

NIAGARA Falls Metal Stamping Works, 230 Tenth St., Niagara Falls, N. Y.

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

RIKER Co., 480 Washington St., Newark, N. J.

ROYAL Enameling & Mfg. Co., 336 W. Madison St., Chicago, Ill.

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

STILLMAN, A. P., 134 Chambers St., New York, N. Y.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

NUTS

CASTELLATED NUTS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

CLARK Bros. Bolt Co., Milldale, Conn. (See page 89.)

COLUMBIA Nut & Bolt Co., 1550 Railroad Ave., Bridgeport, Conn.

Complete Index to Classification appears on Pages 3 to 22.

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Specify

RESILIENT

Detroit Springs

SILENT — TRADE MARK — SELF-LUBRICATING

and you'll buy fewer tires—

One of the three decisive tests of Detroit Springs. The apparatus shown here brings a crushing weight upon the springs—far greater than any it will ever be called upon to bear in actual use. The pressure is applied steadily until the natural bow of the spring is almost reversed. If the spring breaks or fails to come back to its original position it is rejected.

That is only one of many reasons why you should demand Detroit Springs on your next car.

Detroit Springs are *flexible*—not merely bars of steel. The perfectly proportioned resiliency, the exact measure of flexibility that reduces strain and wear on tires, also reduces strain and wear on car mechanism and multiplies the comfort of riding.

And Detroit Springs are as superior in strength as they are in the finer details of service. They are built for the emergency shock. This extra life-insurance costs you nothing extra when you specify Detroit Springs.

Guaranteed Two Years

This extra long guarantee tells the story of Detroit Spring materials and character of workmanship. It proves that the responsibility of your safety, your comfort, your car investment, has been keenly felt, fully accepted, and Detroit Springs built accordingly. You are safe from breakage, protected against "settling" of springs, assured of maximum comfort—and not for a few months only, but for years.

The Springs Without a Squeak

—Silent because self-lubricating. This great advantage is new even to Detroit Springs, and in itself is sufficient reason for you to see that they are on the car you buy. A cavity is stamped into each leaf, and filled with a long-lived lubricant. The more the spring is in action, the more lubricant is distributed, insuring silence and smooth operation, reducing friction, prolonging the life of the spring. Look for the "lubricating cup" at end of each leaf.

FREE—"From Ore to Motor Car"—Let us send you a copy of this book—the only one published to give you first-hand factory information about Automobile Springs. There are facts in this book that every owner of a car should know. Explains how Detroit Springs insure your safety and lengthen the life of your car and tires.

Detroit Steel Products Co., 2274 East Grand Boulevard, Detroit, Mich.

Manufacturers of Fenestra Solid Steel Windows—"The Standard of Industrial Daylighting"

Guaranteed for two years

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NUTS (Continued)

CASTELLATED NUTS (Continued)

DETROIT Screw Works, Detroit, Mich. (See page 661.)

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAHAM Nut Co., Pittsburg, Pa.

MILTON Mfg. Co., Milton, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 359.)

NATIONAL Bolt & Nut Co., Pittsburg, Pa.

RHODE Island Tool Co., Providence, R. I.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

FINISHED AND CASE HARDENED NUTS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 239 and 355.)

CLARK Bros. Bolt Co., Milldale, Conn. (See page 89.)

DETROIT Screw Works, Detroit, Mich. (See page 661.)

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAHAM NUT CO., Pittsburg, Pa.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 429.)

HASKELL Mfg. Co., Wm. H., 451 Main St., Pawtucket, R. I.

MILTON Mfg. Co., Milton, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 359.)

NATIONAL Bolt & Nut Co., Pittsburg, Pa.

NEW HAVEN Machine Screw Co., New Haven, Conn. (See page 487.)

PAWTUCKET Mfg. Co., 327 Pire St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RHODE Island Tool Co., Providence, R. I.

RUSSELL, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

LOCK NUTS AND WASHERS

AMERICAN Lock-Nut Co. (Pullman Station), Chicago, Ill.

AMERICAN Nut & Bolt Fastener Co., Pittsburg, Pa. "Bartley."

BARTLEY—See American Nut & Bolt Fastener Co.

CINCINNATI Screw & Tap Co., 2442 Beekman St., Cincinnati, O.

COLUMBIA Nut & Bolt Co., 1550 Railroad Ave., Bridgeport, Conn.

F. F.—See Fluke, F. S.

FLUKE, F. S., 4742 Langley Ave., Chicago, Ill. "F. F."

GRIP Nut Co., McCormick Bldg., Chicago, Ill.

HOBBS Mfg. Co., Worcester, Mass.

HUGTITE—See United Nut Lock Co.

NATIONAL Lock Washer Co., Johnson & Herman Sts., Newark, N. J.

POSITIVE Lock Washer Co., Newark, N. J. (See page 593.)

RELIANCE Mfg. Co., Massillon, O. (See page 593.)

STEEL Specialties Co., 79 Milk St., Boston, Mass. "W. W. W."

UNITED Nut Lock Co., Springfield, Mass. "Hugtite."

U. S. Lock Washer Co., 34-36 Brenner St., Newark, N. J.

UNIVERSAL Lock-Washer Co., 1555-65 Railroad Ave., Bridgeport, Conn.

W. W. W.—See Steel Specialties Co.

THUMB OR WING NUTS

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

BILLINGS & Spencer Co., Hartford, Conn.

CHICAGO Nut Co., 617-31 W. Jackson Blvd., Chicago, Ill.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 239 and 355.)

CLARK Bros. Bolt Co., Milldale, Conn. (See page 89.)

COLUMBUS Bolt Works, Columbus, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

DETROIT Screw Works, Detroit, Mich. (See page 661.)

DEVLIN Mfg. Co., Thos., Third & Lehigh Aves., Philadelphia, Pa.

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

HASKELL Mfg. Co., Wm. H., 451 Main St., Pawtucket, R. I.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

MILES, Franklin S., 205-07 Quarry St., Philadelphia, Pa.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

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To Catch the "Limited"

To save time in the delivery of freight or passengers, to negotiate all kinds of hills and roads in all kinds of weather and to enjoy the advantage of *speed* without the handicap of *hurry*,—these are some of the considerations that have induced so many manufacturers of high grade cars to adopt

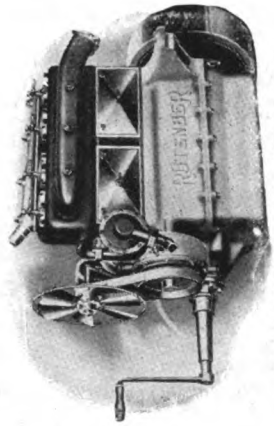
THE RUTENBER MOTOR

There is no truck so heavy but what there is a Rutenber Motor perfectly adapted to its requirements; not a runabout or roadster but what there is a type of Rutenber Motor precisely suited to its needs.

More than a score of the leading pleasure and commercial cars of this year are giving daily evidence of this fact.

May we not send you the list?

THE RUTENBER MOTOR CO. - - Marion, Indiana



Model 27 Standard. Valve Side

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NUTS (Continued)

THUMB OR WING NUTS (Continued)

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

WHITMAN & BARNES Mfg. Co., Akron, O.

OILS

LUBRICATING OILS

A-B-C—See Layton Park Oil & Soap Co.

ACHESON Oildag Co., Port Huron, Mich. "Oildag."

ADVANCE Oil Works, 310-12 Flushing Ave., Brooklyn, N. Y.

AJAX Oil & Grease Co., 170 W. 65th St., New York, N. Y.

ALASKA—See Viscosity Oil Co.

ALBANY Lubricating Co., 70-710 Washington St., New York, N. Y.

ALEXANDER & Co., H. T., 17 Battery Pl., New York, N. Y. "Grand Prix."

AMALIE—See Sonneborn Sons.

AMERICAN Oil Co., Jackson, Mich. "Amoco," "Amoilco."

AMOCO—See American Oil Co.

AMOILCO—See American Oil Co.

APEX—See Viscosity Oil Co.

ARCO—See Atlantic Refining Co.

ARGOLINE—See Ellis & Cumings Oil Works.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland, O. "Arco."

ATLAS—See Swan & Finch Co.

AURORA—See Pigot-Sayre Co.

AUTLUBO—See Moore Oil Co.

AUTO Oil Co., 172 S. Water St., Jackson, Mich. "Diamond Cross."

AUTO-USE-IT—See Sawyer Oil Co.

AUTOLEUM—See Chesterton Co.

AUTOLINE—See Robinson & Son Co.

BAKER, Wm. T., 220-32 Suydam Ave., Jersey City, N. J. "Paramount."

BALKAN—See Jones, C. D.

BANNER—See Clarkson & Ford Co.

BANNER—See Cortland Specialty Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BELDEN & Co., A. G., 145 Maiden Lane, New York, N. Y. "Valvone," "Pycnoleum."

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BLIVEN & Carrington, 115 Broad St., New York, N. Y. "Champion."

BLUE RIBBON—See Sawyer Oil Co.

BORNE, Scrymser Co., 80 South St., New York, N. Y. "Colonial." (See page 287.)

BUCK & Co., E. A., Worcester, Mass.

BULLY—See New York Oil & Grease Co.

CALYPSOL—See Cataract Refining & Mfg. Co.

CASPIAN—See Viscosity Oil Co.

CATARACT Refining & Mfg. Co., Marine National Bank Bldg., Buffalo, N. Y. "Calypsol."

CENTURY—See Davey & Co.

CHAMPION—See Bliven & Carrington.

CHARTER OAK—See Hall-Thompson Co.

CHESTERTON Co., A. W., 64 India St., Boston Mass. "Autoleum."

CINCINNATI Oil Works Co., Cincinnati, O. (See page 143.)

CLARKSON & Ford Co., 55 Water St., New York, N. Y. "Banner."

COLGAN Mfg. & Supply Co., 42 South St., New York, N. Y.

COLONIAL—See Borne, Scrymser Co.

COMMODORE—See Miller Co.

CONNECTICUT Oil Co., 549 S. Leonard St., Waterbury, Conn.

CORTLAND Specialty Co., 176 Railroad St., Cortland, N. Y. "Banner."

CRANE & Co., L. M., 91 Oliver St., Boston, Mass. "Eureka."

CRAWFORD Co., Wm. J., 14 Wood St., Pittsburg, Pa.

CREW Levick Co., Land Title Bldg., Philadelphia, Pa. "Perfection." (See page 149.)

CROWN—See Great Western Oil Co.

CRYSTALENE—See Viscosity Oil Co.

CYLOIL—See Ilsley, Doubleday & Co.

DAVEY & Co., 2600 Grand Ave., Chicago, Ill. "Century."

DEARBORN Chemical Co., McCormick Bldg., Chicago, Ill.

DEFIANCE—See Waverly Oil Works Co.

DIAMOND CROSS—See Auto Oil Co.

DIRIGO—See Platt & Washburn Oil Co.

DRAKE Oil Co., 99 Spring St., Titusville, Pa. "Speed-Oil."

DUPLEX—See Enterprise Oil Co.

EAGLE Oil & Supply Co., Boston, Mass. "No-Karbon," "Eagleine." (See page 293.)

EAGLEINE—See Eagle Oil & Supply Co.

EARLENE—See Franklin Oil Works.

EASTERN Supply Co., Hammond & Canterbury Sts., Worcester, Mass.

ELLIS & Cumings Oil Works, ft. Chestnut St., Reading, Pa. "Argoline."

EMCO—See Emery Mfg. Co.

EMERY Mfg. Co., Bradford, Pa. "Emco."

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

ENSIGN Refining Co., 10605 Quebec Ave., Cleveland, O.

ENTERPRISE Oil Co., 150 Chandler St., Buffalo, N. Y. "Duplex."

EUCLID—See Reliance Oil & Grease Co.

EUREKA—See Crane & Co.

EXCELSIOR—See Miller's Sons.

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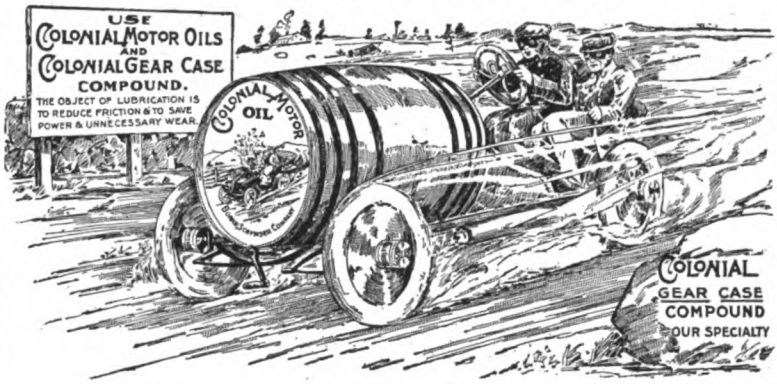
CAN BE HAD AT GARAGES, OR AT ANY OF OUR STORES



COLONIAL MOTOR OIL

COLONIAL GEAR CASE COMPOUND
AND
SILEX GREASE

FOR MOTOR CARS AND
MOTOR BOATS

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80 South Street, New York

BOSTON
Central Wharf

PHILADELPHIA
216 North Front Street

FALL RIVER, MASS.
160 Third Street

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OILS (Continued)

LUBRICATING OILS (Continued)

EXCELSIOR—See Mills Oil Co.

FAULTLESS—See Hawkeye Oil Co.

FIAT—See Pennsylvania Oil Works Co.

FIDELITY Oil Co., 306-10 E. 17th St., Kansas City, Mo.

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Lubroleine."

FRANK Oil Co., Titusville, Pa.

FRANKLIN—See Viscosity Oil Co.

FRANKLIN Oil Works, Franklin, Pa. "Earlene."

FRENCH—See Marshall Oil Co.

FULCRUM Oil Co., Franklin, Pa.

GENERAL Oil Works Co., Traction Bldg., Indianapolis, Ind. "Reliable."

GRAND PRIX—See Alexander & Co.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O. "Nokarbo," "Crown."

GREENSLADE Oil Co., 40 Jefferson Ave., Detroit, Mich. "Packard 24-30."

GULF Refining Co., Frick Bldg. Annex, Pittsburg, Pa.

HAGGERTY Refining Co., 50 South St., New York, N. Y. "Thermo."

HALL-THOMPSON Co., Hartford, Conn. "Charter Oak."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I.
(See page 203.)

HARRIS & Co., Elmer E., 2 Maurice St., Buffalo, N. Y.

HAVOLINE—See Indian Refining Co.

HAWKEYE Oil Co., Waterloo, Ia. "Faultless."

HAWS, George A., 62 Pine St., New York, N. Y. "Panhard."
(See page 289.)

HIGH Grade Oil Refining Co., 68 Broad St., New York, N. Y. "Hygrade," "Motorene," "Packard," "Lozier."

HINDS & Coon, 124-26 Pearl St., Boston, Mass. "Peach."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whizoil."

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

HYGRADE—See High Grade Oil Refining Co

IDEAL—See Sheppard, W. S.

ILSLEY, Doubleday & Co., 229-31 Front St., New York, N. Y. "Cyloil."

INDIAN Refining Co., 17 Battery Pl., New York, N. Y. "Havoline."

INTER-TUBE Chemical Co., Schofield Bldg., Cleveland, O.

INVADER Oil Co., 80 Broad St., New York, N. Y.

INVINCIBLE—See Millers Sons Co.

JONES, C. D., 429 Locust St., Philadelphia, Pa. "Balkan."

KELLOGG & Co., E. H., 233-43 South St., New York, N. Y.

KENDALL Refining Co., Bradford, Pa.

KEYSTONE Lubricating Co., 21st & Clearfield Sts., Philadelphia, Pa.

KOSMOS—See Mulliken Oil Co.

LAYTON Park Oil & Soap Co., Milwaukee, Wis. "A-B-C."

LIBERTY—See Richardson Lubricating Co.

LIBERTY BELL—See Bell Oil Co.

LOOS & Dilworth, 134 S. Front St., Philadelphia, Pa. "Paragon."

LOZIER—See High Grade Oil Refining Co.

LUBRO Oil Co., 116 Prospect Ave., N. W., Cleveland, O.

LUBROLEINE—See Fiske Bros. Refining Co.

McLEAN-JONES Oil & Supply Co., 40 India Wharf, Boston, Mass. "Swastika."

MAGIC—See Viscosity Oil Co.

MAGIE Bros., 110-12 S. Clinton St., Chicago, Ill. "Rock."

MARSHALL Oil Co., Marshalltown, Ia. "French."

METEOR—See Narragansett Chemical Co.

MILLER Co., Wm. P., 244-50 Greene St., Brooklyn, N. Y. "Commodore."

MILLER'S Sons, Wm. P., 298-302 Hancock St., Long Island City, N. Y. "Excelsior," "Pan-O-Lite."

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Invincible."

MILLS Oil Co., 263 Walton St., Syracuse, N. Y. "Excelsior."

MOBILOIL—See Vacuum Oil Co.

MONAMOBILE—See Monarch Mfg. Co.

MONARCH Mfg. Co., Council Bluffs, Ia. "Monamobile."

MONOGRAM—See New York Lubricating Oil Co.

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O. "Autlubo."

MORRIS & Co., Richard S., Chicago, Ill.

MOTORENE—See High Grade Oil Refining Co.

MOTORLIGHT—See Petroleum Coke Co.

MOTORLUBE—See Tygert Co.

MOTOROL—See New York & New Jersey Lubricant Co.

MULLIKEN Oil Co., 200 Friend St., Boston, Mass. "Kosmos."

MURPHYS—See Phoenix Oil Co.

NAPOLEON—See Van Tilburg Oil Co.

NARRAGANSETT Chemical Co., 155-61 Orange St., Providence, R. I. "Meteor."

NATIONAL Oil & Supply Co., Essex & First Sts., Harrison, N. J. "Viscos."

NATIONAL Refining Co., Rose Bldg., Cleveland, O.

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram."
(See page 539.)

NEW York Oil & Grease Co., 128 Maiden Lane, New York, N. Y. "Bully."

NEW York & New Jersey Lubricant Co., 165 Broadway, New York, N. Y. "Motorol."

NOBLE Refining Co., 706 Canal Rd., Cleveland, O.

NO-KARBON—See Eagle Oil & Supply Co.

NOKARBO—See Great Western Oil Co.

NYE, Wm. F., New Bedford, Mass.

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The dealer who handles Panhard Oil has the satisfaction of winning permanent customers, of seeing his oil sales increase from month to month.

Panhard Oil pleases every user because it combines heavy body with freedom from carbon. It is refined with such care that the free tarry matter is extracted without reducing lubricating properties.

Our latest booklet will give many valuable hints on lubricating. Write for it now, and ask for our special proposition to the trade.

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DAVIS TWO CYLINDER ONE-TON TRUCK MOTORS

For absolute, dependable and reliable all-around service, the Davis 5¼" x 4¾" two-cylinder opposed one-ton truck motor cannot be equaled on the market to-day.

The Davis motor is being installed on the highest grade trucks by manufacturers everywhere.

Special features are the governor, which prevents excessive speeding of motor, thereby saving wear and tear on truck, and positive drive geared oil pump in base, absolutely assuring lubrication of all parts of the motor with no attention other than filling when required.

MR. MANUFACTURER! It will pay you to investigate the merits of Davis motors.

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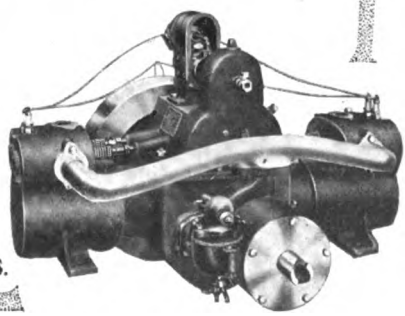

DAVIS MFG. CO.

15TH AVE & PARK ST., MILWAUKEE WIS.

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OILS (Continued)

LUBRICATING OILS (Continued)

OIL City Oil & Grease Co., 365-77 Seneca St., Oil City, Pa. "Pensoil."

OIL Products Co., 17 Battery Pl., New York, N. Y. "Usoline."

OILDAG—See Acheson Oildag Co.

OILZUM—See White & Bagley Co.

OTTOMO—See Pioneer Mfg. Co.

OZARK—See Tropical Oil Co.

PACKARD—See High Grade Oil Refining Co.

PACKARD—See Puritan Oil Co.

PACKARD—See Wolverine Lubricants Co. of New York.

PACKARD 24-30—See Greenslade Oil Co.

PANAMA Oil & Grease Co., 159-61 W. 51st St., New York, N. Y.

PANHARD—See Haws, Geo. A.

PAN-O-LITE—See Miller's Sons.

PARAGON—See Loos & Dilworth.

PARAGON Refining Co., Front St., Toledo, O. "Petrolene."

PARAMOUNT—See Baker, Wm. T.

PARAMOUNT—See Viscosity Oil Co.

PATHFINDER—See Sweet, Charles F.

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

PENN Oil Co., W. 12th St., Erie, Pa.

PENN Oil & Supply Co., Chicago, Ill.

PENN Petroleum Co., 115-17 N. Second St., Philadelphia, Pa. "Primus."

PENNSYLVANIA Oil Works Co., 72 Front St., New York, N. Y. "Fiat," "Zenith," "Velox."

PENSOIL—See Oil City Oil & Grease Co.

PERFECTION—See Crew Levick Co.

PERFECTION—See Wood Co.

PERRY Oil Co., 372 Central Ave., Pawtucket, R. I.

PETROLENE—See Paragon Refining Co.

PETROLEUM Coke Co., Edgemont & Venango Sts., Philadelphia, Pa. "Motorlight."

PETROLEUM Products Co., 3600-10 Grant Blvd., Pittsburg, Pa. "Sound Proof."

PHOENIX Oil Co., 2554 W. Fifth St., Cleveland, O. "Murphys."

PIGOT-SAYRE Co., 71-73 Front St., New York, N. Y. "Aurora."

PIONEER Mfg. Co., 5220 Sweeney Ave., S. E., Cleveland, O. "Ottomo."

PIONEER Oil Co., Old South Bldg., Boston, Mass

PLATT & Washburn Oil Co., 11 Broadway, New York, N. Y. "Dirigo."

POLARINE—See Standard Oil Co. of N. Y.

PRIMUS—See Penn Petroleum Co.

PURE Oil Co., First St., & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURE Oil Co., Fifth & Chestnut Sts., Philadelphia, Pa.

PURITAN—See Pure Oil Co.

PURITAN Oil Co., 1218 W. 70th St., Cleveland, O. "Packard."

PYCNOLEUM—See Belden & Co.

RELIABLE—See General Oil Works Co.

RELIANCE Oil & Grease Co., 1521 Columbus Rd., Cleveland, O. "Euclid."

RICHARDSON Lubricating Co., Quincy, Ill. "Liberty."

RIGHT—See Wagner Oil Co.

ROBINSON & Son Co., Wm. C., 32 South St., Baltimore, Md. "Autoline."

ROCK—See Magie Bros.

SAWYER Oil Co., Howard B., 65 Long Wharf, Boston, Mass. "Blue Ribbon," "Auto-Use-It."

SHEPPARD, W. S., 21 Lawrence St., Newark, N. J. "Ideal."

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SOUND PROOF—See Petroleum Products Co.

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

SPEED-OIL—See Drake Oil Co.

STANDARD Oil Co. of N. Y., New York, N. Y. "Polarine."

STAR Oil Co., 440-42 N. Halsted St., Chicago, Ill.

SULLIVAN Oil Co., 413 Wells St., Chicago, Ill.

SUPERIOR—See Viscosity Oil Co.

SUPERIOR Oil Co., Wade Bldg., Cleveland, O.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass. "Velvet."

SWAN & Finch Co., 151 Maiden Lane, New York, N. Y. "Atlas."

SWASTIKA—See McLean-Jones Oil & Supply Co

SWEET, Charles F., 247 State St., Hartford, Conn. "Pathfinder."

TEXAS Co., New York, N. Y. "Texaco."

TEXACO—See Texas Co.

THERMO—See Haggerty Refining Co.

TIONA Refining Co., Indianapolis, Ind.

TROPICAL Oil Co., W., 70th St. & L. S. & M. S. Ry., Cleveland, O. "Ozark."

TYGERT Co., E. A., 126 N. Front St., Philadelphia, Pa. "Motorlube."

UNDERHAY Oil Co., 276 Franklin St., Boston, Mass.

UNION Petroleum Co., 135 S. Second St., Philadelphia, Pa.

USOLINE—See Oil Products Co.

VACUUM Oil Co., Rochester, N. Y. "Mobiloil."

VALVOLINE Oil Co., 11 Broadway, New York, N. Y.

VALVONE—See Belden & Co.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. Napoleon."

VELOX—See Pennsylvania Oil Works Co.

VELVET—See Sutherland & Co.

VISCO Motor Oil Co., 2104 Superior Viaduct, Cleveland, O.

VISCOS—See National Oil & Supply Co.

VISCOSITY Oil Co., 1101-03 W. 37th St., Chicago, Ill. "Caspian," "Crystalene," "Franklin," "Visoco," "Zero," "Alaska," "Paramount," "Apex," "Superior," "Magic."

VISOCO—See Viscosity Oil Co.

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We offer to automobile manufacturers perfectly reliable Babbitt Metal of the highest efficiency, either in the form of ingots or in pressure die castings.

The latter are dense, free from blowholes and of the same quality which has made our Phoenix Metal the standard of comparison wherever high-grade Babbitt Metal is required.

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New York **Boston** **Buffalo** **Chicago**
Cincinnati **Cleveland** **Pittsburg** **St. Louis**

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OILS (Continued)

LUBRICATING OILS (Continued)

WAGNER Oil Co., 551 W. 42d St., New York, N. Y. "Right."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O.

WAVERLY Oil Works Co., 54th St. & A. V. R. R., Pittsburg, Pa. "Defiance."

WHALE—See Nye, Wm. F.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Oilzum."

WHIZOIL—See Hollingshead Co.

WILBURINE Oil Works, 11 Broadway, New York, N. Y.

WINN, Wm. R., 143 Maiden Lane, New York, N. Y.

WOLFS HEAD—See Wolverine Lubricants Co. of N. Y.

WOLVERINE Lubricants Co. of N. Y., 80 Broad St., New York, N. Y. "Packard," "Wolfs Head."

WOOD Co., W. A., 373 Atlantic Ave., Boston, Mass. "Perfection."

YOUKIM—See Young & Kimball.

YOUNG, Orlando W., 180 Freylinghuysen Ave., Newark, N. J.

YOUNG & Kimball, Frank L., 111 Purchase St., Boston, Mass. "Youkim."

ZENITH—See Pennsylvania Oil Works Co.

ZERO—See Viscosity Oil Co.

ZURN Co., O. F., 2736-38 N. Broad St., Philadelphia, Pa. "Zurnoil."

ZURNOIL—See Zurn Co.

ORNAMENTS

RADIATOR ORNAMENTS

ÆTNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

BALZER Co., Gus, 1777 Broadway, New York, N. Y.

CRAMP & Sons Ship & Engine Building Co., William, Philadelphia, Pa.
(See page 269.)

GOODWIN & Kintz Co., Winsted, Conn.

INTERNATIONAL Silver Co., Meriden, Conn.

RONSON Specialty Co., 7-15 Mulberry St., Newark, N. J.

PACKING

ASBESTOS AND FIBROUS PACKING

AMBESCO—See American Asbestos Co.

AMERICAN Asbestos Co., Norristown, Pa. "Ambesco."
(See page 54.)

BROWN & Co., Charles D., 140 Washington St., North Boston, Mass. "Vellumoid."
(See page 295.)

BURGMANN, FEODOR, 5-9 Beekman St., New York, N. Y. (Importer.)

CAREY Co., Philip (Lockland), Cincinnati, O

CRANDALL Packing Co., Palmyra, N. Y.

DEFENDER—See Woven Steel Hose & Rubber Co.

DEMON—See Hart Packing Co.

EAGLE Oil & Supply Co., Boston, Mass.
(See page 293.)

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J. "Motobestos."

ENDURA Mfg. Co., 6306 Eastwich Ave., Philadelphia, Pa.

ESSEX Rubber Co., Trenton, N. J.

GARLOCK Packing Co., Palmyra, N. Y.

GENERAL Asbestos & Rubber Co., Charleston, S. C.
(See page 421.)

HART Packing Co., 144 High St., Boston, Mass. "Demon."

HODGART & Co., 122 S. Michigan Ave., Chicago, Ill.

J. M. MOBILENE—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J. M. Mobilene."

KEASBEY & Mattison Co., Ambler, Pa.

KNOWLTON Rubber Co., Geo. W., 60 Pearl St., Boston, Mass.

MOTOBESTOS—See Empire Tire Co.

SALL Mountain Asbestos Mfg. Co., 230 S La Salle St., Chicago, Ill.

STAYBESTOS Mfg. Co., (Germantown), Philadelphia, Pa.
(See page 61.)

VELLUMOID—See Brown & Co.

WOVEN Steel Hose & Rubber Co., Trenton, N. J. "Defender."
(See page 63.)

METALLIC PACKING

(See Gaskets, Metallic)

RUBBER PACKING

BOSTON Belting Co., 256-60 Devonshire St., Boston, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 585.)

CRANDALL Packing Co., Palmyra, N. Y.

EAGLE Oil & Supply Co., Boston, Mass.
(See page 293.)

GARLOCK Packing Co., Palmyra, N. Y.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HART Packing Co., 144 High St., Boston, Mass.

HOME Tire Co., Trenton, N. J.
(See page 419.)

KNOWLTON Rubber Co., Geo. W., 60 Pearl St., Boston, Mass.

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A positive no carbon oil has become a necessity, a convenience and a pleasure.
We guarantee Eagleine No-Karbon to give satisfaction in every way.
If you are not using our oil, will you try a better oil than you are now using?

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ALUMINUM MATTING
STRONGEST IN SERVICE AND LOWEST IN COST

Stock sizes for 50 ft. rolls are 9, 10, 12, 14, 15, 18 and 20 inch widths; for 24 ft. rolls 24, 30 and 36 inch widths. Of course special lengths and widths can always be supplied.

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J-shape running board moulding in 10 to 14 ft. lengths in stock for immediate delivery.

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Made of special extra heavy aluminum that lasts longer than the car.
Write for samples of matting and moulding.
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Dealers and Jobbers—Good profits are yours—if you push these articles.
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TYPE	No. CYL	BORE	STROKE	H P	WEIGHT
A	2	4.5"	6"	12–15	350 lbs.
B	4	4.5"	6"	25–30	475 "
C	4	5"	6.5"	40–45	565 "
B	6	4.5"	6"	40–45	785 "
C	6	5"	6.5"	50–60	870 "
Special F	4	6.25"	8.75"	70–80	800 "
Special F	6	6.25"	8.75"	100–120	1200 "

JENCICK MOTOR CORP.,

PORT CHESTER, NEW YORK

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PACKING (Continued)

RUBBER PACKING (Continued)

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MATTSON Rubber Co., Lodi, N. J. (See page 419.)

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

REPUBLIC Rubber Co., Youngstown, O.

THERMOID Rubber Co., Trenton, N. J. "Vulcanoid." (See page 490.)

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. (See page 371.)

VULCANOID—See Thermoid Rubber Co.

PADS

LICENSE PADS

(See Numbers, License)

PAINTS

PAINTS AND COLORS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ARSENAL Varnish Co., Rock Island, Ill.

AULT & Wiborg Co., New, Seventh & Culvert Sts., Cincinnati, O.

BAY STATE—See Wadsworth, Howland & Co.

BESCO—See Buffalo Enamel Stain Co.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

BROWN & Co., Joseph M., 31 W. Kinzie St., Chicago, Ill.

BUCKEYE Paint & Varnish Co., 15th & Lucas Sts., Toledo, O.

BUFFALO Enamel Stain Co., White Bldg., Buffalo, N. Y. "Besco."

BUFFALO Oil Paint & Varnish Co., Buffalo, N. Y.

BULLS-EYE—See Zinsser & Co.

CAPITOL CITY—See Indianapolis Paint & Color Co.

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill. "King."

CINCINNATI Color Co., Eighth & Evans Sts., Cincinnati, O.

CINCINNATI Varnish Co., 211 South St., Cincinnati, O.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

DITZLER Color Co., 18 W. Baltimore Ave., Detroit, Mich.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FLINT Varnish Works, Flint, Mich.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

HANLINE Bros., Baltimore, Md. (See page 295.)

HEATH & Milligan Mfg. Co., 1325-71 Seward St., Chicago, Ill.

HIGH STANDARD—See Lowe Bros. Co.

HILDRETH Varnish Co., 90 West St., New York, N. Y.

HOFFMAN Paint & Varnish Co., 3 Medford St., Boston, Mass.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Capitol City."

JOHNSTON Paint Co., R. F., Cincinnati, O. (See page 167.)

KEYSTONE Paint & Filler Co., Munsey, Pa.

KING—See Chicago White Lead & Oil Co.

LOWE Bros. Co., Dayton, O. "High Standard."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y.

MOORAMEL—See Moore & Co.

MOORE & Co., Benjamin, 231-33 Front St., Brooklyn, N. Y. "Mooramel."

MOSER Co., Chas., Cincinnati, O.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

NELSON Color Co., Amesbury, Mass.

NICE, Eugene E., 272-74 S. Second St., Philadelphia, Pa.

PATTERSON-SARGENT Co., E. 38th & St. Clair Sts., Cleveland, O.

PIERCE Co., F. O., 12 W. Broadway, New York, N. Y.

RICKER-BENNETT Co., 37 Harris St. (N. Cambridge), Cambridge, Mass.

ST. LOUIS Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo.

SHRACK & Co., C., 152 N. Fourth St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SMITH & Co., Edward, Sixth St. & West Ave., Long Island City, N. Y.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y.

WADSWORTH, Howland & Co., 84 Washington St, Boston, Mass. "Bay State."

WILHELM Co., A., Third & Bern Sts., Reading, Pa.

WILLEY Co., C. A. (Hunter's Point), New York, N. Y. (See page 295.)

ZINSSER & Co., W., 195 William St., New York, N. Y. "Bulls-Eye."

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PAINTS (Continued)

ALUMINUM AND BRONZE PAINTS

ALUSTRIUM—See Devoe & C. T. Raynolds Co.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 167.)

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

BINSWANGER & Co., B., 829-35 N. Third St., Philadelphia, Pa.

BRONZE Powder Works Co., Elizabeth, N. J. "Ideal," "Vulcan."

COLOPHITE—See Rosenbluth & Co.

CULLEN & Co., F. C., First National Bank Bldg., Chicago, Ill.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y. "Alustrium."

GENTER Co., J. H., Newburgh, N. Y. "Mirroroide."
(See page 297.)

GERSTENDORFER Bros., 231 E. 42d St., New York, N. Y. "Sapolin."

IDEAL—See Bronze Powder Works Co.

KEMP Co., W. H., 165 Spring St., New York, N. Y.

MIRROROIDE—See Genter Co.

ROSENBLUTH & Co., A. J., 440 Elm St., New Haven, Conn. "Colophite."

SAPOLIN—See Gerstendorfer Bros.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y.

SLIKUP—See Arnold, N. B.

VULCAN—See Bronze Powder Works Co.

ENAMEL PAINTS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill.

AKRON Varnish Co., Akron, O. "Imperial."

AULT & Wiborg Co., New, Seventh & Culvert Sts., Cincinnati, O.

ARMITAGE & Co., John L., Newark, N. J.

BAY STATE—See Wadsworth, Howland & Co.

BERRY Bros., Detroit, Mich.

BESCO—See Buffalo Enamel Stain Co.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

BOYER Chemical Laboratory Co., 8 E. Michigan St., Chicago, Ill.

BUFFALO Enamel Stain Co., White Bldg., Buffalo, N. Y. "Besco."

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y.

COLUMBUS Varnish Co., Columbus, O. "Peerless."

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

ESSEX Varnish Co., 92 Vesey St., Newark, N. J.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FLINT Varnish Works, Flint, Mich.

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

HANLINE Bros., Baltimore, Md.
(See page 295.)

HARDY Paint & Varnish Co., Toledo, O.
(See page 297.)

IMPERIAL—See Akron Varnish Co.

LACQUER-ALL Mfg. Co., 2006-12 N. Lamar St., Dallas, Tex.

MASURY & Son, John W., New York, N. Y.

MOLLER & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

PEERLESS—See Columbus Varnish Co.

PRATT & Lambert, Buffalo, N. Y.

ROYAL—See Wilhelm Co.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

STANDARD Varnish Works (Elm Park), Port Richmond, N. Y.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y.

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass. "Bay State."

WILHELM Co., Third & Bern Sts., Reading, Pa. "Royal."

EXHAUST PIPE AND MUFFLER PAINTS

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Silkup."
(See page 167.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

BULGER Varnish Co., William, 3053 E. 87th St., Cleveland, O.

C. O. T.—See Tingley & Co.

CENTURY—See Arnstein, Eugene.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

GENTER Co., J. H., Newburgh, N. Y. "Mirroroide."
(See page 297.)

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

MIRROROIDE—See Genter Co.

NEVER-BURN—See Northwestern Chemical Co.

NORTHWESTERN Chemical Co., Marietta, O. "Pioneer," "Never-Burn."
(See pages 143 and 551.)

PIONEER—See Northwestern Chemical Co

RIE-NIE—See Durkee-Atwood Co.

RUBBERSET Co., 56 Ferry St., Newark, N. J.

SLIKUP—See Arnold, N. B.

TINGLEY & Co., Chas. O., Rahway, N. J. "C. O. T."

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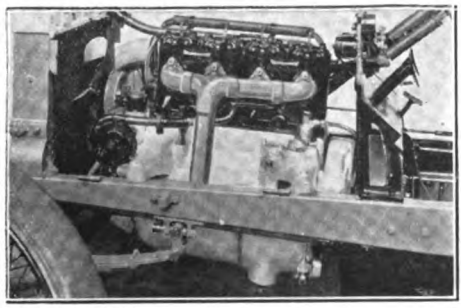

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RUBBER PAINTS

(For refinishing rubber mats and matting and painting tires.)

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 167.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill.

ATLAS Auto Supply Co., 95 E. Adams St., Chicago, Ill. "Preservo."
(See page 149.)

AUTO Products Co. of America, 116 N. Commercial St., St. Louis, Mo. "Punchs."

BRADLEY & Vrooman Co., Chicago, Ill. "Velvet."

BULL DOG—See Polson Bros. Mfg. Co.

CHIEFTAIN Mfg. Co., Charleston, W. Va. "Tire-Life."

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

JEWEL—See Wadsworth-Howland Co.

K M C—See Karboneater Mfg. Co.

KARBONEATER Mfg. Co., Vanadium Bldg., Pittsburg, Pa. "K M C."

KORINE Carbon Remover Co., 114 Friend St., Amesbury, Mass. "Tire-Life."

NARCO TIRENEW—See National Rubber Co.

NATIONAL Rubber Co., 4409 Papin St., St. Louis, Mo. "Narco Tirenew."
(See page 543.)

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

NORTHWESTERN Chemical Co., Marietta, O. "Tire-Lac."
(See pages 143 and 551.)

PAGE-LESTER Co., 125 W. Van Buren St., Chicago, Ill. "Tire-Kote."

POLSON Bros. Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog."

PRESERVO—See Atlas Auto Supply Co.

PUNCHS—See Auto Products Co. of America.

RIE-NIE—See Durkee-Atwood Co.

RUBBERSET Co., 56 Ferry St., Newark, N J.

SECURITY Reliner Co., 33 Meade St., Montgomery, N. Y.

SIN-TI Rubber Co., Home Life Bldg., Washington, D. C.

SLIKUP—See Arnold, N. B.

STURDY Mfg. Co., 2637 Michigan Ave., Chicago, Ill. "Tyre-Tonic."

TINGLEY & Co., Chas. O., Rahway, N. J "Tire Solder."

TIRE-KOTE—See Page-Lester Co.

TIRE-LAC—See Northwestern Chemical Co.

TIRE-LIFE—See Chieftain Mfg. Co.

TIRE-LIFE—See Korine Carbon Remover Co.

TIRE SOLDER—See Tingley & Co.

TYRE TONIC—See Sturdy Mfg. Co.

VAN CLEEF Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

VELVET—See Bradley & Vrooman Co.

WADSFORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WONDER WORKER—See Hall-Thompson Co.

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ANDRAE & Sons Co., Julius, 858-64 Broadway, Milwaukee, Wis.

CUTLER-HAMMER Mfg. Co., 12th St. & St. Paul Ave., Milwaukee, Wis.

CUTTER Co., Geo., South Bend, Ind.

ELECTRIC Storage Battery & Mfg. Co., Cincinnati, O.

GENERAL Electric Co., Schenectady, N. Y.

H. K.—See Krantz Mfg. Co.

KRANTZ Mfg. Co., H., 160-66 Seventh St., Brooklyn, N. Y. "H. K."

LANG Electric Co., J., 423 N. Lincoln St., Chicago, Ill.

LEONARD Electric Co., Ward, Bronxville, N. Y.

METROPOLITAN Electric Mfg. Co., East Ave. & 14th St., Long Island City, N. Y.

WESTERN Electric Co., 463 West St., New York, N. Y.

WOOD PANELS

AMERICAN Veneer Co., 1501 Clinton St., Hoboken, N. J.
(See page 83.)

DANN Bros. & Co., 30-33 Franklin St., New Haven, Conn.

EMPIRE Panel & Veneer Co., 940 Seneca St., Buffalo, N. Y.

HOFFMAN Bros. Co., 300 W. Main St., Fort Wayne, Ind.

MICHIGAN Veneer Co., Alpena, Mich.

NEW Jersey Veneer Co., 258 W. Railway Ave., Paterson, N. J.

WISCONSIN Seating Co., New London, Wis.

PANS

DRIP PANS

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(See page 333.)

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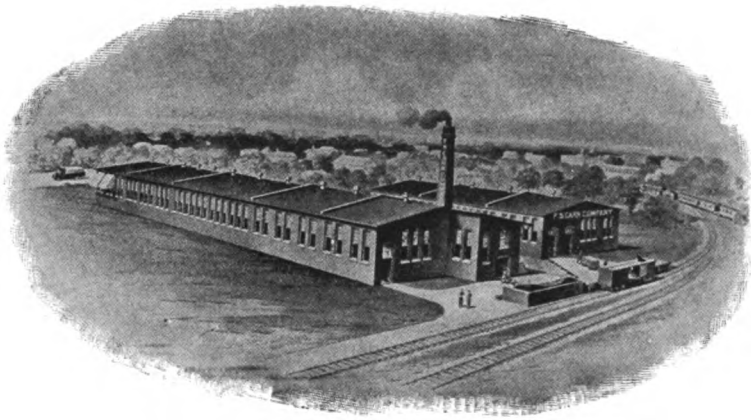

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BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

CULLEN-ATKINSON Co., 120 Allyn St., Hartford, Conn. "Hartford."

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.
(See page 467.)

DURLACH, I., 199-201 Wooster St., New York, N. Y.

F & H—See Foss-Hughes Co.

FOSS-HUGHES Co., Market & 21st Sts., Philadelphia, Pa. "F. & H."

HARTFORD—See Cullen-Atkinson Co.

HAYES Mfg. Co., Detroit, Mich.
(See pages 78 and 79.)

IDEAL Sheet Metal Works, 2807 Michigan Ave., Chicago, Ill.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 441.)

LAWSON Co., F. H., Cincinnati, O.

REID Co., 1603 Second Ave., Moline, Ill.

ROCHESTER Can Co., 103-09 Hague St., Rochester, N. Y.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SEXTON Can Co., Hartford & Wendell Sts., Boston, Mass.

SMYTH Garage Pan Mfg. Co., Patchogue, N. Y.

TODD Mfg. Co., 320-24 Mary Pl., Minneapolis, Minn.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 169.)

DUST PANS OR UNDER BONNETS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BUNN-HUTCHINSON Co., 330 Prospect Ave., N. W., Cleveland, O.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

HAYES-IONIA Co., Ionia, Mich.

IDEAL Sheet Metal Works, 2807 Michigan Ave., Chicago, Ill.

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Pressed Steel Co. (E. Moline), Moline, Ill.

MULLINS Co., W. H., 182 Franklin St., Salem, O.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

WELDED Steel Barrel Corp., Leib & Wight Sts., Detroit, Mich.

XARDELL Bros Co., 28 Broadway, Utica, N. Y.

PAPER

FRICTION PAPER

(See Frictions, Fibre)

PASTE

HAND PASTE

(See Soaps, Hand)

SOLDERING PASTE

(See Flux, Soldering)

TRIMMERS PASTE

BUCKEYE Paste Co., Columbus, O.

PATCHES

TIRE REPAIR PATCHES

(See also Shoes, Inner Tire; also Sleeves, Tire Repair)

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O. "Cling-Tite."

BATAVIA Rubber Co., Batavia, N. Y.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

BULL DOG—See Polson Bros. Mfg. Co.

CENTURY—See Niehoff & Co.

CHEMI Co., 629 E. Main St., Richmond, Va. "Se-Ment-All."

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 585.)

CLING-TITE—See American Tire & Rubber Co.

CONTINENTAL Rubber Works, Erie, Pa.
(See page 419.)

DAYTON Inner-Tire & Mfg. Co., 17 N. Madison St., Dayton, O.

DIAMOND Rubber Co., Akron, O.

DOUBLE Fabric Tire Co., 60 W. Ninth St., Auburn, Ind.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

EVERLASTING—See Legnard & Co.

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PATCHES (Continued)

TIRE REPAIR PATCHES (Continued)

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Selbst-Gemacht."

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

K-C—See Western Tire & Rubber Co.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

LEGNARD & Co., A. B., Waukegan, Ill. "Everlasting."

M. & M. Mfg. Co., Akron, O.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Century." (See page 167.)

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

POLSON Bros. Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog."

QUICK-TITE Patch Co., 20 Market St., Amsterdam, N. Y.

RUBBER Goods Supply & Mfg. Co., Akron, O.

S. H. Mfg. Co., 1761 Broadway, New York, N. Y.

SE-MENT-ALL—See Chemi Co.

SEAMLESS Rubber Co., New Haven, Conn.

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

SELBST-GEMACHT—See Gray Specialty Co.

STANDARD Rubber & Cable Co., Bridgeport, Conn.

TINGLEY & Co., Chas. O., Rahway, N. J.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

WESTERN Tire & Rubber Co., 17th St. & Grand Ave., Kansas City, Mo., "K-C."

WONDER WORKER—See Hall-Thompson Co.

YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J.

PATTERNS

AUTOMOBILE PATTERN MAKERS

ACME Pattern Co., Grant & Letchworth Sts., Buffalo, N. Y.

ACME Pattern Works, 9 Woodward Ave., Detroit, Mich.

BUFFALO Pattern Works, 13-17 Perry St., Buffalo, N. Y.

EASTERN Pattern Works, 28-32 Wight St., Detroit, Mich.

HARTFORD Pattern & Model Co., 120 Allyn St., Hartford, Conn.

JACOBSEN & Co., K. F., Racine, Wis. (See page 303.)

JURACK Pattern Works, Chas., 199-201 Oregon St., Milwaukee, Wis.

LUZIER & Son, T. B., 1641-45 N. Tenth St. Philadelphia, Pa.

MICHIGAN Pattern Works, 13 Catherine St. Detroit, Mich.

NESOM Mfg. Co., 22 W. South St., Indianapolis, Ind.

NOBACH Pattern Works, W. J., 522-24 Jackson Blvd., Chicago, Ill.

PEERLESS Pattern Works, 405 E. Madison St., South Bend, Ind.

PHILLIPS, C. H. & W. H., 27 Purchase St., Boston, Mass.

REMMERS Pattern Co., 2121 N. Ninth St., St. Louis, Mo.

STANDARD Pattern Works, 144-46 Fort St. E., Detroit, Mich.

STANDARD Pattern Works Co., 5337 St. Clair Ave., Cleveland, O.

WALKER Bros. Co., 216 Walton St., Syracuse, N. Y.

WALLACE, John D., 527 W. Van Buren St., Chicago, Ill.

WEST & Dodge, 334 Atlantic Ave., Boston, Mass.

WHITELEY Bros., 82-84 Church St., New York, N. Y. (See page 303.)

PEDALS

HORN AND CUT OUT PEDALS

B. & B. Mfg. Co., 6526 Carnegie Ave., Cleveland, O.

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CLEVELAND Hardware Co., Cleveland, O.

COX Brass Mfg. Co., Albany, N. Y. (See page 467.)

DAYTON Malleable Iron Co., Dayton, O.

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

ELECTRIC Horn & Specialty Co., 119 Columbia St., Utica, N. Y. "Oneita."

F & K—See Findeisein & Kropf Mfg. Co.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. "F & K," "Husk."

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich.

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HUSK—See Findeisen & Kropf Mfg. Co.

MEDINA Stamping & Machine Co., Medina, N. Y.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium." (See page 507.)

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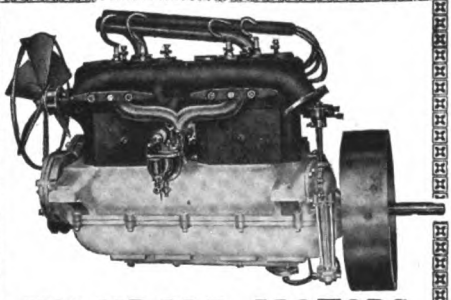

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PEDALS (Continued)

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MOTOR & Mfg. Works Co., Dunkirk, N. Y. (See page 219.)

ONEITA—See Electric Horn & Specialty Co.

POWELL Muffler & Timer Co., 42 La-Fayette St., Utica, N. Y. (See page 453.)

RADIUM—See Milwaukee Auto Specialty Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C., B. & Q. R. R., Chicago, Ill. (See page 97.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J. (See page 271.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

RATCHET PEDALS

(For locking Brakes, etc.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. (See page 221.)

SPECIAL ACCELERATOR PEDALS

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. "Imperial-Wixon." (See page 135.)

IMPERIAL-WIXON — See Imperial Brass Mfg. Co.

PINIONS

METAL AND RAWHIDE PINIONS

(See Gears)

PINS

COTTER PINS

AKRON Machine Co., Akron, O.

BROOKS & Sons, M. S., Chester, Conn.

COBB & Drew, Plymouth, Mass.

HINDLEY Mfg. Co., John St., Valley Falls, R. I.

HUBBARD Spring Co., M. D., Pontiac, Mich. (See page 385.)

JENCKES Mfg. Co., E., 28 Union St., Worcester, Mass.

McWHORTER Mfg. Co., Riverton, N. J.

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

PICKERING Co., R. S., Sharon Hill, Pa.

SACO—See Smith & Co.

SMITH & Co., F. P., 114 Railroad Ave., Sharon Hill, Pa. "Saco."

WHITMAN & Barnes Mfg. Co., Akron, O.

WIRE Goods Co., 28 Union St., Worcester, Mass.

ESCUTCHEON PINS

ATLAS Tack Co., Fairhaven, Mass.

BLAKE & Johnson Co., Waterbury, Conn.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y.

KEYSTONE—See Grammes & Sons.

MILWAUKEE Tack Co., 27th Ave. & Wahl St., Milwaukee, Wis.

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

TURNER & Seymour Mfg. Co., Torrington, Conn.

WATERBURY Mfg. Co., Waterbury, Conn.

WIRE Goods Co., 28 Union St., Worcester, Mass.

PISTON PINS

ASHLEY Machine Works, 724 University Ave., Rochester, N .Y. (See page 261.)

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 305.)

STERLING Machine Co., Norwich, Conn.

WAINWRIGHT & Son, W. W., Connersville, Ind. (See page 307.)

TAPER PINS

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 239 and 355.)

CORBIN Screw Corp., 219 High St., New Britain, Conn.

DETROIT Screw Works, Detroit, Mich. (See page 661.)

FERRY Cap & Set Screw Co., 2151 Scranton Rd., Cleveland, O.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 429.)

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Sewing Machine Co., Belvidere, Ill.

PERRY-FAY Mfg. Co., Elyria, O.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

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SUPERIOR AUTOMOBILE PARTS

ACCURATELY MADE

PROMPT DELIVERIES

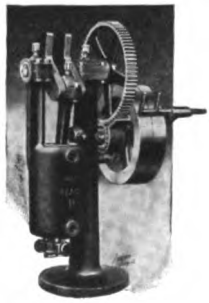
STANDARD
PISTON RINGS
IN ALL REGULAR SIZES
IN QUANTITIES
FOR THE
Manufacturer
AND
IN SMALL LOTS
FOR
REPAIRS

DIE CASTINGS

AIR COMPRESSORS

Special Die Cast Bearing Bushings made in quantities from any of the standard bearing metals according to your blue-prints and specifications.

A full line of Air Compressors and accessories for Auto Garage use. Single and three Cylinder styles; belt and motor driven. Catalog on request.



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THE F.W. SPACKE MACHINE CO
INDIANAPOLIS, INDIANA, U.S.A.

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PINS (Continued)

TAPER PINS (Continued)

STANDARD Tool Co., 6900-34 Central Ave., Cleveland, O.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

PIPE

WROUGHT IRON AND STEEL PIPE

BYERS Co., A. M., 235 Water St., Pittsburg, Pa.

CRANE Co., 836 S. Michigan Ave, Chicago, Ill.

LA BELLE Iron Works, Steubenville, O.

MARK Mfg. Co., Chicago, Ill.

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa.

READING Iron Co., Reading, Pa.

SPANG, Chalfant & Co., Union Bank Bldg., Pittsburg, Pa.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

PIPING

EXHAUST AND INTAKE PIPING

(See Manifolds, Exhaust)

PISTONS

FINISHED AND MACHINED PISTONS

HARRISBURG Pipe & Pipe Bending Co., Harrisburg, Pa.

HULL Mfg. Co., Lansing, Mich. (See page 307.)

WAINWRIGHT & Son, W. W., Connersville, Ind. (See page 307.)

PLATES

NAME PLATES

AMERICAN Name Plate & Engraving Co., 352 Atlantic Ave., Boston, Mass.

BECKER Engraving Co., August, 247 Atlantic Ave., Boston, Mass.

BERNARD Co., J., 422-30 E. 53d St., New York, N. Y.

BLACKINTON & Co., V. H., Attleboro Falls, Mass.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CHANDLER Co., Napier St., Springfield, Mass.

COLGAN Co., J. W., Sudbury Bldg., Boston, Mass.

CROWE Name Plate & Engraving Co., Chicago, Ill. (See page 307.)

ELECTRO-CHEMICAL Engraving Co., 450 19th St., Brooklyn, N. Y.

ETCHING Company of America, 2526-28 W. Congress St., Chicago, Ill.

GRAMMES & Sons, L. F., Jordan & Union Sts., Allentown, Pa.

GREENDUCK Co., 2127 Van Buren Pl., Chicago, Ill.

HAEUSERMANN Metal Mfg. Co., 1098-1102 Brook Ave., New York, N. Y.

HANSON, C. H., 178 N. Clark St., Chicago, Ill.

HENDERSON-AMES Co., Main, Park & Water Sts., Kalamazoo, Mich.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

MAYER Co., Geo. J., 36 S. Meridian St., Indianapolis, Ind.

METROPOLTAN Mfg. Co., Detroit, Mich.

MURDOCK, Jr. Co., Jas., 116 Opera Pl., Cincinnati, O.

NEW York Stencil Works, 100 Nassau St., New York, N. Y.

PREMIER Metal Etching Co., 617-21 E. 18th St., New York, N. Y.

QUINT'S Sons Co., S. H., 15 S. Fourth St., Philadelphia, Pa.

ROBBINS Mfg. Co., John, 58 Kneeland St., Boston, Mass.

SHEPARD Mfg. Co., Melrose Highlands, Mass.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

STAFFORD Co., N., 67 Fulton St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

WALTER & Sons, N. C., 3 Park Row, New York, N. Y.

WATSON Co., Mechanics St., Attleboro, Mass.

WHITEFORD & Co., Jos. G., 165 N. Jefferson St., Chicago, Ill.

WRIGHT & Son, Greg. G., 119-21 Opera Pl., Cincinnati, O.

YEUELL Co., E. V., Middlesex Ct., Malden, Mass.

PLATING

BRASS AND NICKEL PLATING

AMERICAN Car & Ship Hardware Mfg. Co., 2-4 Mechanic St., New Castle, Pa.

B-T-K Gear & Engine Co., 620-30 S. Elliot St., Muncie, Ind. (See page 135.)

BOESCH Lamp Co., 1135 Mission St., San Francisco, Cal.

BOSTON Nickel Plating Co., 160 Portland St., Boston, Mass.

BRIDGEPORT Electro Plate Co., 270 Kossuth St., Bridgeport, Conn.

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The

CROWN TRUCK
For 1914
HAS WORM DRIVE

Mr. Dealer: Buyers are *demanding* worm drive because it means *silence, neatness, efficiency* and *greater power.* You can cash in on this demand with the **Crown Truck.** The **Crown** will enable you to meet the fiercest competition in your field and have talking points as good as your biggest rivals.

Not only is the worm drive a point in your favor, but there are other advantages, such as single high-tension spark Bosch magneto, long-stroke motor, four-speed selective transmission, left drive, center control, etc. These make the **Crown** a good sales proposition.

Then the fact that the **Crown** does the work of commerce at a surprisingly low cost per mile **keeps** it sold.

WRITE FOR OPEN TERRITORY—NOW

Crown Commercial Car Co.
NORTH MILWAUKEE, WIS.

NAME PLATES
FOR AUTOMOBILES

ACCESSORIES, MACHINERY, ETC.

ETCHED SILL AND DASH PLATES

SKELETON RADIATOR

LIGHT METAL STAMPING AND FORMING

LET US FIGURE ON YOUR REQUIREMENTS

WE SUBMIT DESIGNS & SAMPLES

CAREFUL EXECUTION
PROMPT DELIVERIES

Crewe Name Plate and Engraving Co. Chicago

SPECIALISTS

We can supply our standard type pistons or make them to your B/Ps.

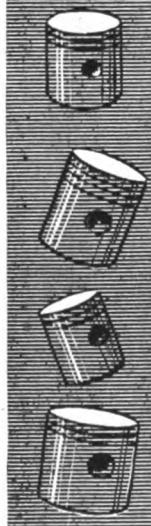
Our standard type piston rings have secured hundreds of satisified customers for us.

Piston pins uniformly case hardened and ground to exact diameters.

We are in shape to figure on your cylinders of any type in quantity lots.

W. W. Wainwright & Son
Connersville, Ind.

PISTON
SPECIALISTS



There is an old saying among machinery manufacturers—"As the piston, so is the power."

All our business experience has been concentrated on the manufacture of this part of a motor. We are qualified, both by our experience and our complete equipment, to give manufacturers the best pistons that can be made.

Let us figure with you.

Hull Mfg. Co.
Lansing, Mich.

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PLATING (Continued)

BRASS AND NICKEL PLATING (Continued)

BRIDGEPORT Metal Goods Mfg. Co., Howard Ave. & Spruce St., Bridgeport, Conn.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CREUTZ Plating Co., Cincinnati, O.

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

EXETER Brass Works, Exeter, N. H.

FRIES & Co., Buffalo, N. Y.

HILLMAN Auto Supply Mfg. Co., 98 Massachusetts Ave., Boston, Mass.

HOLT & Beebee Co., 51 Chardon St., Boston, Mass.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

METROPOLITAN Mfg. Co., Detroit, Mich.

NEHLS Plating Works, 248 Brush St., Detroit, Mich.

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E., Detroit, Mich.

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.
(See page 271.)

PLATINUM

(See also Points, Sparking)

AMERICAN Platinum Works, 225-31 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J.
(See page 475.)

BISHOP & Co., Platinum Works, J., Malvern, Pa.

COMMERCIAL Research Co., Tuckahoe, N. Y.
(See page 565.)

DEE & Co., Thos. J. D., Mallers Bldg., Chicago, Ill.

GOLDSMITH Bros. Smelting & Refining Co., Heyworth Bldg., Chicago, Ill.

PLATT, C. S., 29 Gold St., New York, N. Y.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y.
(See page 511.)

PLIERS

TIRE REPAIR PLIERS

ERICKSON & Son, P. E., Port Chester, N. Y.
(See page 361.)

GILMER, Jr., G. Walker, 52 Seventh St., Philadelphia, Pa.

NATIONAL Cutlery Co., Westmoreland & Boudinot Sts., Philadelphia, Pa.

PLUGS

CHARGING PLUGS AND RE TACLES

ANDERSON Mfg. Co., Albert & J. M., St., Boston, Mass.

GENERAL Electric Co., Schenectady, N.

LANG Electric Co., J., 423 N. Lincol Chicago, Ill.

RUSSELL & Stoll Co., 48 Cliff St., New N. Y.

WESTINGHOUSE Electric & Mfg. Co. Pittsburg), Pittsburg, Pa.

SPARK PLUGS

A. C.—See Champion Ignition Co.

A-Q—See All-And-Co.

ACME Sales Co., 237 Jefferson Ave., D Mich. "Lore."

ACME Telephone & Mfg. Co., Albia "Flash."

AJAX—See Star Specialty Mfg. Co.

ALBRIGHT Ignition Co., Columbus, Ga.

ALL-AND-CO., Springfield, Mass. "A-

ALL-IN-ONE—See Frontier Specialty C

AMERICAN Coil Co., Foxboro, Mass.

ANCHOR—See Szel Import & Export Co.

ANDERSON Spark Plug Co., 206 N. liday St., Baltimore, Md.
(See page 599.)

ARROW—See Reflex Ignition Co.

AUBURN—See New York Mica & Mfg. C

AURORA Vulcan Co., Security Bldg., Bri port, Conn.

AUTO-MARINE—See Legnard & Co.

AXWELL Equipment Co., 421 Wood St., P burg, Pa.

BABY REFLEX—See Reflex Ignition Co.

BEAT-EM-ALL—See Mosler & Co.

BECKLEY-RALSTON Co., Michigan Ave Randolph St., Chicago, Ill. "Vict "Copperhead," "Diamond."

BELVIDERE Screw & Machine Co., Be dere, Ill.

BENFORD Mfg. Co., Box H, Mt. Vern N. Y. "Monarch," "Home Run."
(See page 599.)

BENTON Co., L. F., Vergennes, Vt.

BEST Ignition Equipment Co., 200 W. St., New York, N. Y.

BETHLEHEM—See Silvex Co.

BIGSBY Mfg. Co., 7500 Quincy A Cleveland, O. "Vital."
(See pages 215 and 315.)

BINGHAM Mfg. Co., 227 Prospect Ave., W., Cleveland, O. "Snappon."

BLACK EAGLE—See Standard Co.

BLAKE Spark Plug Co., 101 Concord A Cambridge, Mass.

BLICKENSDERFER & Co., G. C., Stamf Conn. "Bulls Eye."

BLUE Head—See Perpetual Spark Plug

BOSCH Magneto Co., 223 W. 46th St., York, N. Y.

BOUGIE-MERCEDES—See Herz & Co.

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Mosler Spit Fire PRIMING Plug

Ford

AND ALL OWNERS
READ THIS

Not a copy.
Original in design.
Not a makeshift.
Made an integral part of the plug
No valves to leak.
No soldered extension.
The groove in the plug is the receptacle for the gasoline.
The body of the shell carries a needle-valve which seats itself, making an absolutely hermetically sealed joint.

024

NATIONAL AUTO SHOWS
NEW YORK, JAN. 3-10
CHICAGO, JAN. 24-31

A. R. MOSLER & CO. MT. VERNON, N.Y.

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PLUGS (Continued)

SPARK PLUGS (Continued)

BREECH-BLOCK—See Mosler & Co.

BROCKETT-GORHAM Co., Marion, O. "Bro-Gor."

BRO-GOR—See Brockett-Gorham Co.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

BULLS EYE—See Blickensderfer & Co.

BURNHAM Spark Plug Co., East Edgecomb, Me.

BUSCOBA—See Bush-Scott Co.

BUSH-SCOTT Co., Detroit, Mich. "Buscoba."

CENTERFIRE—See Milwaukee Auto Specialty Co.

CHAMPION Ignition Co., Flint, Mich. "A. C," "Titan."
(See page 591.)

CHAMPION Spark Plug Co., 134 Upton Ave., Toledo, O.
(See page 311.)

CHARTER & Co., Hoopeston, Ill.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CLEVELAND—See Pennsylvania Rubber & Supply Co.

COMET—See Oakes & Dow Co.

COMMON Sense—See Splitdorf Electrical Co.

COPPERHEAD—See Beckley-Ralston Co.

CZAR Ignition Co., 539-43 Ellicott St., Buffalo, N. Y.

DAY, Geo. F., 21 Haverhill St., Boston, Mass.

DE LUXE—See Lockwood-Ash Motor Co.

DELTA Mfg. Co., Bloomfield, N. J.

DETROIT—See Simplex Auto Specialty Co.

DIAMOND—See Beckley-Ralston Co.

DIEN, Ch., 17 Battery Pl., New York, N. Y. (Importer.) "Edco."

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

DOXEY, N. D., 197 E. Washington Ave, Elmira, N. Y. "Lightning."

DUPLEX Multi-Spark Plug Co., Devils Lake N. D. "Maher."

ECLIPSE—See Star Specialty Mfg. Co.

EDCO—See Dien, Ch.

EDISON—See Jeffery-DeWitt Co.

EISEMANN Magneto Co., 225-27 W. 57th St., New York, N. Y.
(See page 265.)

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex."

ELGIN Spark Plug & Ignition Co., 21 S. Spring St., Elgin, Ill.

EMPIRE—See Grant Mfg. & Machine Co.

EZEKLEEN—See Perpetual Spark Plug Co.

FAW, J. H., 41 Warren St., New York, N. Y. "Red Seal."
(See page 585.)

FIREFLY—See Sharp Spark Plug Co.

FLASH—See Acme Telephone & Mfg. Co.

FLASH LIGHT—See Janney, Steinmetz & Co.

FRANKLIN Machine Co., 770 Franklin Ave., Brooklyn, N. Y.

FRONTIER Specialty Co., 600 Ellicott St., Buffalo, N. Y. "All-In-One."
(See page 313.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GOTHAM—See Sturdy Mfg. Co.

GRANT Mfg. & Machine Co., Bridgeport, Conn. "Empire."
(See page 519.)

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y. "Red-Head."

HAGSTROM Bros. Mfg. Co., Lindsborg, Kans.

HAMPSHIRE Mfg. Co., Hatfield, Mass. "Wizard," "Rival."

HARTFORD Machine Screw Co., Hartford, Conn. "Master"
(See page 429.)

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J.
(See page 367.)

HECO—See Heinze Electric Co.

HEINZE Electric Co., Lowell, Mass. "Heco."
(See page 581.)

HEL-FI—See Motor Accessories Mfg. Co.

HERZ & Co., New York, N. Y. "Bougie-Mercedes."
(See page 599.)

HOME RUN—See Benford Mfg. Co.

HOT SHOT—See K-W Ignition Co.

IDEAL Switch Co., Plainville, Conn.

INGLE-HUNT Motors Co., 16-18 Shipman St., Newark, N. J.

J-D—See Jeffery-Dewitt Co.

J-M—See Johns-Manville Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Flash Light."
(See page 411.)

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich. "Reliance," "J-D," "Edison."
(See pages 315 and 325.)

JERICHO—See Randall-Faichney Co.

JEWELL—See Pittsfield Spark Coil Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

JOHNSON Bros., 803 Downing St., Denver, Colo.

K-W Ignition Co., 2833 Chester Ave., Cleveland, O. "Vim," "Hot Shot."

KINGSTON—See Kokomo Electric Co.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind.

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

LEADER—See Long Bros.

LEGNARD & Co., A. B., Waukegan, Ill. "Auto-Marine."

LEHMAN Mfg. Co., J. H., 727 Seventh Ave., New York, N. Y.

LIGHTNING—See Doxey, N. D.

LIGHTNING—See Reflex Ignition Co.

LIGHTNING KID—See Reflex Ignition Co.

LOCKWOOD-ASH Motor Co., Horton & Main Sts., Jackson, Mich. "De Luxe," "Never Miss."

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Ask for "Champion" Priming Plugs

Don't Accept Any Substitutes for Them

Champion Priming Plugs start any motor, in any weather, on the first quarter turn.

They are so good that, of course, they were promptly imitated.

Champion Priming Plugs have special features by which you can tell them.

If the name **"Champion"** isn't on the porcelain, you may be sure it isn't genuine.

The **"Champion"** is the only priming plug which sends the gasoline down a special channel, through the wall of the plug.

That's why it won't "soot up" or break the porcelain.

It puts the few drops of gasoline needed right at the firing points, and explodes them with a hot, fat, **"Champion"** spark.

There are no better spark plugs made. that's why **"Champions"** are initial equipment for three-fourths of all the cars being made in America.

Open needle valve slightly (you needn't remove glove) and inject gasoline. Passing through its own channel to plug base, it vaporizes directly at spark point.

See that the name "Champion" is on the porcelain

Champion Spark Plugs are regular equipment of over 75% of the American made cars today, including the two largest manufacturers: Ford and Overland.

The Champion "Regular" is the general type best adapted for cars of 25 h.p. and over. **The Champion "X,"** for lower powered cars, is the best known and most popular spark plug in this country.

There is a **Champion** for every sort of car, motorcycle, motorboat or aeroplane.

Dealers everywhere find Champion Priming Plugs splendid boosters of their winter sales.
They are sold and guaranteed at $1.25 each.

(Licensed under the Canfield Patent No. 612,701, Oct. 18, 1898)

Champion Spark Plug Company

134 Upton Avenue — **TOLEDO, OHIO**

Export Representatives, AUTOMOBILE SUNDRIES CO., 18 Broadway, New York

Trade Mark

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PLUGS (Continued)

SPARK PLUGS (Continued)

LONG Bros., Broadway & Buckeye St., Kokomo, Ind. "Leader," "Ramble."

LONG Distance Spark Plug Co., 212 S. Illinois St., Indianapolis, Ind.

LORE—See Acme Sales Co.

McCORMICK Mfg. Co., First & Sears Sts., Dayton, O.

MAC-KAE BLITZ—See Randall-Faichney Co.

MAHER—See Duplex Multi-Spark Plug Co.

MASTER—See Hartford Machine Screw Co.

METEOR—See Star Specialty Mfg. Co.

METZGER, C. A., 13 Canal Pl., New York, N. Y. "Soot Proof."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Centerfire," "Victor."
(See page 507.)

MONARCH—See Benford Mfg. Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y. "Spit Fire," "Triumph," "Beat-em-all," "Breech-Block," "Vesuvius."
(See page 309.)

MOTOR Accessories Mfg. Co., 34 W. Main St., Marshalltown, Ia. "Hel-Fi."

NATIONAL Coil Co., Lansing, Mich.

NEVER MISS—See Lockwood-Ash Motor Co.

NEW York Mica & Mfg. Co., Auburn, N. Y. "Auburn," "Wright."

OAKES & Dow Co., 15 Chardon St., Boston, Mass. "Comet," "Sootless."

OVERLAND Spark Plug Co., Boston, Mass.

PEERLESS—See Toledo Spark Plug Mfg. Co.

PENN—See Pennsylvania Rubber & Supply Co.

PENNSYLVANIA Rubber & Supply Co., 1845-47 Euclid Ave., Cleveland, O. "Penn," "Cleveland."

PERFECTION Specialty Mfg. Co., 115-17 W. Second Ave., Cincinnati, O.

PERFEX—See Electric Goods Mfg. Co.

PERPETUAL Spark Plug Co., 330 E. Drinker St., Dunmore, Pa. "Blue Head." "Ezekleen."

PITTSFIELD Spark Coil Co., Dalton, Mass. "Jewell."
(See page 141.)

PORTER & Co., W. S., 608 S. Dearborn St., Chicago, Ill. "Radium."

RADIUM—See Porter & Co.

RAJAH Auto Supply Co., Bloomfield, N. J.
(See page 315.)

RAMBLE—See Long Bros.

RANDALL-FAICHNEY Co., Boston, Mass. "Jericho," "Mac-Kae Blitz."
(See page 229.)

RED-HEAD—See Grossman Mfg. Co.

RED SEAL—See Faw, J. H.

RED SHIELD—See Wesco Supply Co.

REFLEX Ignition Co., 211 High Ave., Cleveland, O. "Arrow," "Lightning," "Lightning Kid," "Baby Reflex."

RELIANCE—See Jeffery-Dewitt Co.

REX Ignition Mfg. Co., 1779 Broadway, New York, N. Y.

RIVAL—See Hampshire Mfg. Co.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 153.)

SCHUG Electric Mfg. Co., 326 Jefferson Ave., Detroit, Mich.

SHARP Spark Plug Co., 3343 Broadview Rd., Cleveland, O. "Firefly."

SILVEX Co., 60 Wall St., New York, N. Y. "Bethlehem."

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich. "Detroit."

SIMPLEX Tool & Supply Co., 201 Devonshire St., Boston, Mass.

SIOUX City Machine & Tool Co., First & Virginia Sts., Sioux City, Ia.

SNAPPON—See Bingham Mfg. Co.

SOOTLESS—See Oakes & Dow Co.

SOOT PROOF—See Mezger, C. A.

SPEEDWAY Plug Co., 1506 Harrison Ave., Cincinnati, O.

SPIT FIRE—See Mosler & Co.

SPLITDORF Electrical Co., 93 Warren St., Newark, N. J. "Common Sense."

STA-RITE—See Sturdy Mfg. Co.

STANDARD Co., Torrington, Conn. "Black Eagle."
(See page 591.)

STAR Specialty Mfg. Co., 227-33 W. Erie St., Chicago, Ill. "Ajax," "Meteor," "Eclipse."

STERLING Machine & Stamping Co., Wellington, O.

STURDY Mfg. Co., 2637 Michigan Ave., Chicago, Ill. "Sta-Rite," "Gotham," "Vulcan," "Venus."

SUPERIOR Motor Specialty Co., 44 N. Fourth St., Philadelphia, Pa.

SURE FIRE—See U. S. Auto Supply Co.

SZEL Import & Export Co., 359 Broadway, New York, N. Y. (Importers.) "Anchor."

T. A. D.—See Toledo Auto Devices Co.

THOMASSON Mfg. Co., Portland, Ia.

TITAN—See Champion Ignition Co.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

TOLEDO Spark Plug Mfg. Co., Factories Bldg., Toledo, O. "Peerless."

TRIUMPH—See Mosler & Co.

UKO—See Utility Co.

U. S. Auto Supply Co., 182 Grand River Ave., Detroit, Mich. "Sure Fire."
(See page 405.)

UTILITY Co., 636 W. 44th St., New York, N. Y. "Uko."

V-RAY Co., Marshalltown, Ia.
(See page 591.)

VENUS—See Sturdy Mfg. Co.

VESUVIUS—See Mosler & Co.

VICTOR—See Beckley-Ralston Co.

VICTOR—See Milwaukee Auto Specialty Co

VIM—See K-W Ignition Co.

VITAL—See Bigsby Mfg. Co.

VOLCANO Spark Plug Co., Ashland, O.

VULCAN—See Sturdy Mfg. Co.

WASCO—See Washington Automobile Supply Co.

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ALL-IN-ONE

PRICE $1.25 EACH

FORD OWNERS can do away with expensive starting devices by the use of **"ALL-IN-ONE" FORD PLUGS** — a Spark Plug expressly designed for **FORD CARS.**

The **"ALL-IN-ONE" FORD PLUG** combines the best features of ordinary spark plugs with a priming device that starts your car in **WINTER with a couple easy turns of the crank.**

A few drops of gasoline injected into the cylinder through the **"ALL-IN-ONE"** Priming Cup, will start your motor, **INSTANTLY, UNFAILINGLY, EASILY,** no matter how cold the day, or how long the motor has stood.

Far Superior to **OTHER PRIMING PLUGS. LAST LONGER, GIVES LESS TROUBLE— MORE SPEED** and **POWER.**

FRONTIER SPECIALTY CO.

600 ELLICOTT STREET, BUFFALO, N.Y.

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PLUGS (Continued)

SPARK PLUGS (Continued)

WASHINGTON Automobile Supply Co., Washington, Ill. "Wasco."
(See page 671.)

WESCO Supply Co., Seventh St. & Clark Ave., St. Louis, Mo. "Red Shield."

WICO—See Witherbee Igniter Co.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WITHERBEE Igniter Co., Springfield, Mass. "Wico."

WIZARD—See Hampshire Mfg. Co.

WRIGHT—See New York Mica & Mfg. Co.

XXX Auto Accessory Co., Springfield, Mass.
(See page 599.)

TIRE REPAIR PLUGS

BATAVIA Rubber Co., Batavia, N. Y.

GOODRICH Co., B. F., Akron, O.

TINGLEY & Co., Chas. O., Rahway, N. J.

YATMAN Rubber Co., 267-69 Mt. Pleasant Ave., Newark, N. J.

POINTS

SPARKING POINTS

(See also Platinum)

AMERICAN Platinum Works, 225-31 N. J. R. R. Ave., Newark, N. J.

BAKER & Co., Newark, N. J.
(See page 475.)

BISHOP & Co. Platinum Works, J., Malvern, Pa.

BOKER & Co., Herman, 101 Duane St., New York, N. Y. (Importers). "Meteor."

COMMERCIAL Research Co., Tuckahoe, N. Y. "Comreco."
(See page 565.)

COMRECO—See Commercial Research Co.

DRIVER-HARRIS Wire Co., Harrison, N. J. "Ignito."

ELECTRICAL Alloy Co., Morristown, N. J.

HEEREN Bros. & Co., Penn Ave. & Ellesmere St., Pittsburg, Pa.

IGNITO—See Driver-Harris Wire Co.

METEOR—See Boker & Co.

NEY Co., J. M., 265 Asylum St., Hartford, Conn.

QUEEN-GRAY Co., 616-18 Chestnut St., Philadelphia, Pa.

ROESSLER & Hasslacher Chemical Co., 100 William St., New York, N. Y.
(See page 511.)

POLISHES

AUTOMOBILE BODY POLISHES

(See also Soaps, Automobile)

A-O-K—See Ulrich & Co.

A-S-K—See Aull-Sides-Klean Co.

ADAMS Grease & Oil Co., 161 W. 51st St., New York, N. Y. "Apollo."

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Hy-Pol."

ALDER Chemical Co., Mt. Vernon, N. Y. "Star."

AMERICUS Products Mfg. Co., Detroit, Mich.
(See page 317.)

APOLLO—See Adams Grease & Oil Co.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 167.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ARROW—See Peterson Co.

AULL-SIDES-KLEAN Co., 317-30 E. Fifth Ave., Cincinnati, O. "A-S-K."

AUTO-GLOSS—See Indianapolis Paint & Color Co.

AUTOGLOSS—See Sisk Mfg. Co.

AUTO-KLEAN—See Lucas & Co.

AUTO VAR—See Glazene Co.

AUTOCLEAN—See Bridgeport Wood Finishing Co.

B. P. S.—See Patterson-Sargent Co.

B-BRITE—See Polish Products Co.

BAILEYS—See Crown Mfg. Co.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BEN-HUR Metal Polish Co., 108 E. Market St., Crawfordsville, Ind.

BLUE RIBBON — See International Metal Polish Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Old Reliable," "Premium."

BOBRICK Chemical Co., 111-17 S. Garey St., Los Angeles, Cal. "Three X."

BODY-NU—See Nu-Back Mfg. Co.

BORNSCHEIN & Co., John F., 6420 Sangamon St., Chicago, Ill. "Schein."

BOYER Chemical Laboratory Co., 8 E. Michigan St., Chicago, Ill.

BREWSTER, W. M., Paterson, N. J. "S. S. S."

BRIDGEPORT Wood Finishing Co., New Milford, Conn. "Autoclean."

BROOKS & Co., Clarence, 249-77 Chestnut St., Newark, N. J.

BUFFALO Oil, Paint & Varnish Co., Buffalo, N. Y.

BUFFALO Specialty Co., 375 Ellicott St., Buffalo, N. Y. "Liquid Veneer."

CALLERY & Co., W. W., 183 36th St., Pittsburg, Pa.

CENTURY—See Arnstein, Eugene.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

CHIEF KOKOMOKO—See National Products Co.

CINCINNATI Oil Works Co., Cincinnati, O. "Re-Nu."
(See page 143.)

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa.

CONTINENTAL Oil Co., Denver, Colo. "Semdac."

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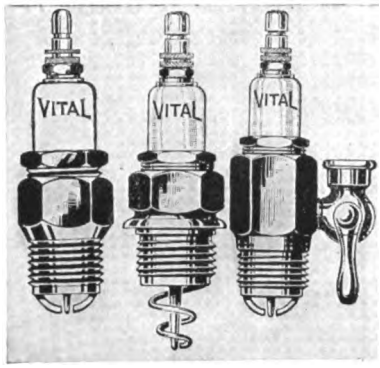
Vital Spark Plugs



Standard	Spiral	Priming
$1.00	$1.00	$1.25

The Big Powerful Plug that gives lasting service and satisfaction. It has solid nickel electrode and contact points. Careful provision for contraction and expansion is made insuring against porcelain breakage resulting from heat.

The Bigsby Manufacturing Co.

7500 Quincy Ave. Cleveland, O.

Licensed under Canfield Patent No. 612701

RAJAH

PRIMING PLUG

Priming cup soldered in firmly to prevent leaking. Material and workmanship of the highest grade — fully up to the standard set by us for over ten years. Terminals as shown furnished with every Plug.

$1.50

RAJAH AUTO SUPPLY CO. - - Bloomfield, N. J.

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Hughson & Merton, Inc.: San Francisco, Los Angeles, Portland, Seattle, Denver

SPARK JEFFERY-DEWITT CO. DETROIT, MICH. REG. U S PAT OFF PLUGS

$1.00

Made in many types to suit any motor

People everywhere have insisted on having these plugs that combine the finest handiwork and the costliest materials—at the price of ordinary plugs. The *J-D* Visible Gap Spark Plug "that locates ignition troubles at a glance," without testing and without removing the plug from the motor; and the *J-D* Conical or Petticoat Plug with closed end, also with platinum points—supreme in oily motors—have sold and resold in enormous quantities. Beyond a question they are the most popular plugs ever introduced.

75c

DEALERS:

Will you share in *J-D* profits? Write for particulars. Do it now!

JEFFERY-DEWITT COMPANY, 54 Butler Avenue, DETROIT, MICHIGAN

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POLISHES (Continued)

AUTOMOBILE BODY POLISHES (Continued)

CROWN Mfg. Co., Indianapolis, Ind. "Baileys."

CUNNINGHAM—See Pitt Specialty Co.

DAVIS Co., W. C., 237 N. Main St., Brockton, Mass. "Superior."

DIAMOND Specialty Co., Indianapolis, Ind.
(See page 317.)

DIAMOND Wood Polish Co., Washington Trust Bldg., Washington, Pa.

DOZIT—See Kirk Mfg. Co.

DURKEE-ATWOOD Co., Minneapolis, Minn. "Rie-Nie."
(See page 167.)

ECLAT Mfg. Co., 3425 S. State St., Chicago, Ill.

EZY-BRITE—See Rodriguez, R. E.

FINALINE Co., 4907 Maple Ave., St. Louis, Mo.

FLINT Varnish Works, Flint, Mich.

GLAZENE Co., 1330 W. Jackson Blvd., Chicago, Ill. "Auto Var."

GLISTENER Mfg. Co., 622 Cypress Ave., Kansas City, Mo. "Lee's." "Varnishine."

GLO Co., 38 Hedden Pl., East Orange, N. J.

GOLDEN STAR—See Morris Mfg. Co.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker."

HALLETT & Co., H. M., Ludington, Mich. "New Life."

HAWKEYE Oil Co., Waterloo, Ia.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Nugloss."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

HY-POL—See Adams & Elting Co.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Auto-Gloss."

INTERNATIONAL—See St. Louis Surfacer & Paint Co.

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

INTERNATIONAL Polish Co., 367 Jefferson Ave., Rochester, N. Y.

JEWEL—See Wadsworth-Howland Co.

K M C—See Karboneater Mfg. Co.

KARBONEATER Mfg. Co., Vanadium Bldg., Pittsburg, Pa. "K M C."

KIRK Mfg. Co., Gumbel Bldg., Kansas City, Mo. "Dozit."

KORINE Carbon Remover Co., 114 Friends St., Amesbury, Mass. "Nulustre."

LEE'S—See Glistener Mfg. Co.

LIQUID VENEER—See Buffalo Specialty Co.

LORD Polish Co., F. T., 37 Hovey Ave., Cambridge, Mass. "Sun-Glo."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa. "Auto-Klean."

LUSTRE Mfg. Co., 6 N. Clark St., Chicago, Ill.

McDOUGALL Varnish Co., Buffalo. N. Y.

MAGICLEAN—See Schmoeger, Frederic A.

MAJESTIC—See Suydam Co

MARATHON—See New York Oil & Grease Co.

MATCHLESS—See Standard Oil Co. of N. Y.

MODOC Co., Drexel Bldg., Philadelphia, Pa.

MONARCH—See Suydam Co.

MONOGRAM—See New York Lubricating Oil Co.

MONROE Specialty Co., 347 W. Broadway, New York, N. Y. "Sunrise."

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O.

MORRIS Mfg. Co., R. W., Gumbel Bldg., Kansas City, Mo. "Golden Star."

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

NATIONAL Products Co., 8 Courtland Blk., Kokomo, Ind. "Chief Kokomoko."

NAY Chemical Co., Tom, Holden, Mo.

NEW LIFE—See Hallett & Co.

NEW Method Varnish Co., 210 W. Hudson St., Elmira, N. Y. "Uncle Hiram's."

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram."
(See page 539.)

NEW York Oil & Grease Co., 128 Maiden Lane, New York, N. Y. "Marathon."

NEMO—See Niehoff & Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Nemo."
(See page 167.)

NORTHWESTERN Chemical Co., Marietta, O. "Pioneer."
(See pages 143 and 551.)

NOXAL—See Noxall Polish Mfg. Co.

NOXALL Polish Mfg. Co., 1238 Belmont Ave., Philadelphia, Pa. "Noxal."

NU-BACK Mfg. Co., St. Louis, Mo. "Body-Nu."

NUGLOSS—See Hollingshead Co.

NULUSTRE—See Korine Carbon Remover Co.

O. K.—See Sheppard, W. S.

OLD RELIABLE—See Blue Ribbon Mfg. Co

ORIENT Chemical Co., Gumbel Bldg., Kansas City, Mo.

P. D. Q.—See Page-Lester Co.

PAGE-LESTER Co., 125 W. Van Buren St., Chicago, Ill. "P. D. Q."

PATTERSON-SARGENT Co., E. 38th & St. Clair Sts., Cleveland, O. "B. P. S."

PERUVIAN—See Sweet, Charles F.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PIONEER—See Northwestern Chemical Co.

PITT Specialty Co., 1016 Congress St., N. S., Pittsburg, Pa. "Cunningham."

POLISH Products Co., 606 Broadway, Kansas City, Mo. "B-Brite."

PREMIUM—See Blue Ribbon Mfg. Co.

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURITAN—See Pure Oil Co.

RAPID—See Shannon, T. R.

RATH Mfg. Co., Hedley & Richmond Sts., Philadelphia, Pa.

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The Most Efficient Polish on the Market

Absolutely Harmless to any Polished Surface.

You will recommend them to your trade when you try them.

Quality will be remembered long after Price is forgotten.

Price to Consumers

Auto Body Tonic
Gall. $3.00: Half Gall. $1.75: Qts. $1.00

Brass and Metal Polish
Gall. $1.75: Half Gall. $1.15: Qts. $:65

Special Price to Dealers and Manufacturers.

Pin a $2.00 bill to your letter head and we will send you a Half Gallon can of each by Parcel Post.

Americus Products Mfg. Co., Detroit, Mich., U. S. A.

Looking For A Real Nickel Polish?

Diamond Velvet Metal Polish

Solves The Problem And It Works Equally As Well On All Other Metals

LOOK FOR DIAMOND THE DIAMOND

We Also Manufacture

DIAMOND VELVET VENEER. A Perfect Body Polish.
DIAMOND RADIATOR CEMENT. For Repairing Leaky Radiators.
DIAMOND CARBON REMOVER. It Actually Does Do The Business.
DIAMOND CLEANSER. A Pure Linseed Oil Soap.

Write For Our Proposition To Dealers

Diamond Specialty Co. - Indianapolis, Ind.

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POLISHES (Continued)

AUTOMOBILE BODY POLISHES (Continued)

RE-NU—See Cincinnati Oil Works Co.

RIE-NIE—See Durkee-Atwood Co.

RODRIGUEZ, R. E., 56-58 Warren St., New York, N. Y. "Ezy-Brite."

ROYAL Lubricating Oil Co., 116 Broad St., New York, N. Y.

RUB-ON Mfg. Co., 89 Brayton St., Buffalo, N. Y.

S. S. S.—See Brewster, W. M.

ST. LOUIS Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo. "International."

SCHEIN—See Bornschein & Co.

SCHMOEGER, Frederic A., Sterling, Ill. "Magiclean."

SEMDAC—See Continental Oil Co.

SHANNON, T. R., 19 Lorraine St., Hartford, Conn. "Rapid."

SHEPPARD, W. S., 21 Lawrence St., Newark, N. J. "O. K."

SHINAUTO Mfg. Co., 1137-39 N. Illinois St., Indianapolis, Ind.

SILCO—See Silvex Co.

SILVEX Co., 60 Wall St., New York, N. Y. "Silco"

SISK Mfg. Co., R. J., New London, Conn. "Autogloss."

SLIKUP—See Arnold, N. B.

SPARKLER Mfg. Co., 108 Main St., Fairmount, Ind.

STANDARD Oil Co. of N. Y., New York, N. Y. "Matchless."

STAR—See Alder Chemical Co.

SUN-GLO—See Lord Polish Co.

SUNRISE—See Monroe Specialty Co.

SUPERIOR—See Davis Co.

SUTHERLAND & Co., P., 232 Milk St., Boston, Mass.

SUYDAM Co., M. B., 61st & Butler Sts., Pittsburg, Pa. "Monarch," "Majestic."

SWEET, Charles F., 247 State St., Hartford, Conn. "Peruvian."

THREE X—See Bobrick Chemical Co.

THUMB, E. W., 872 Orleans St., Chicago, Ill.

U-AUTO-VARNISH Co., 345 The Arcade, Cleveland, O.

ULRICH & Co., E. North & Rose Sts., Buffalo, N. Y. "A-O-K."

UNCLE HIRAM'S—See New Method Varnish Co.

VAN TILBURG Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Waxit."

VARNISHINE—See Glistener Mfg. Co.

VICTOR Mfg. Co., 72 Chestnut St., Newark, N. J.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O.

WAXIT—See Van Tilburg Oil Co.

WERNER-SERVICE Mfg. Co., 263 Fairmount Ave., Jersey City, N. J.

WONDER WORKER—See Hall-Thompson Co

METAL POLISHES

A. & R. Co., Wallingford, Conn.

A-O-K—See Ulrich & Co.

A-S-K—See Aull-Sides-Klean Co.

ACME Polish Co., 71 S. 12th St., Pittsburg, Pa. "Ayrolite."

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Shinite."

AJAX—See Crowell Chemical Co.

AMALIE—See Sonneborn Sons.

AMERICAN—See Harvey Chemical Co.

AMERICAN Motor Equipment Co., 27 Haverhill St., Boston, Mass. "Dazzleine," "Cinch."

AMERICAN Metal Polish Co., 89 Winslow Ave., W., West Somerville, Mass. "North Star," "Meyers."

AMERICAN Oil & Disinfectant Co., 96 Beekman St., New York, N. Y. "Sparrow."

AMERICUS Products Mfg. Co., Detroit, Mich.
(See page 317.)

ANCHOR—See Hoffman Paint & Varnish Co.

APEX POLISHINE—See Millers Sons Co.

ARCO SPOTZOFF—See Atlantic Refining Co.

ARMIGER Chemical Co., 2155-57 Austin Ave., Chicago, Ill. "Rex."

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup."
(See page 167.)

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Shine-All."

ARROW—See Peterson Co.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland, O. "Arco Spotzoff."

ATLAS Auto Supply Co., 95 E. Adams St., Chicago, Ill. "Sta-Brite."
(See page 149.)

AUBURN Specialties Co., 3 N. Green St., Auburn, N. Y. "Blitz."

AULL-SIDES-KLEAN Co., 317-30 E. Fifth Ave., Cincinnati, O. "A-S-K."

AUTO Bright Mfg. Co., 210 Main St., Buffalo, N. Y.

AYROLITE—See Acme Polish Co.

B-BRITE—See Polish Products Co.

BAILEYS—See Crown Mfg. Co.

BAR-NIC—See Barcy-Nicholson Co.

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich. "Bar-Nic."

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BEACON—See Cincinnati Oil Works Co.

BELL—See Reid Mfg. Co.

BELL Mfg. Co., Maine & Gratiot Sts., St. Louis, Mo. "Star."

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BEN Hur Metal Polish Co., 108 E. Market St., Crawfordsville, Ind.

BERTRAM—See New Jersey Paint Works.

BLACK Silk Stove Polish Works, Sterling, Ill.

BLITZ—See Auburn Specialties Co.

BLUE RIBBON—See International Metal Polish Co.

BLUE Ribbon Mfg. Co., 27 Baldwin St., (Charlestown), Boston, Mass. "Peerless," "Kantburn," "Premium."

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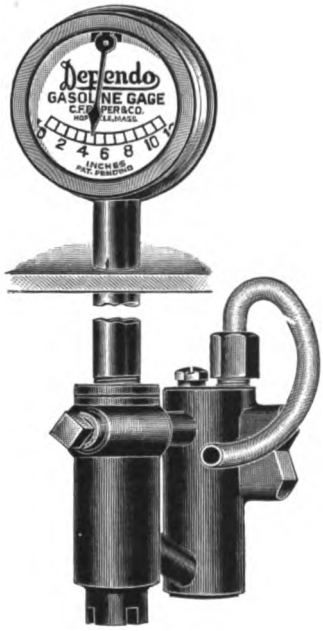
Owners of the 1912-1913

Ford, Overland, Buick, E. M. F. and 1913 Studebaker Will be Saved All Kinds of Gasoline Troubles by Installing

The Dependo Gasoline Gauge

Attaches to the Dash

$7.50 Brass or Nickel Finish



Accurate and dependable—up hill, down hill, on side list and on the hottest and coldest days.

No more dry tanks miles from garage; no more pulling up cushions to use measuring stick. Detects leaky tanks at once. Shows instantly amount of gasoline that goes into tank and amount consumed per mile.

One week's use will prove it a necessity. Full instructions sent for installing.

When ordering state make, model and year of your car.

If for cars not mentioned in this ad, send us name, model and year and we will notify you if we can supply you at once. Not made at present for cars having pressure tanks.

If your dealer cannot supply you, we will direct, on receipt of price.

Send for catalog No. 10, giving full particulars.

A WORD TO DEALERS

Dependo Gasoline Gauge is the first and only dependable one ever invented. Yet you know the demand for a gauge of the character of Dependo has been and is insistent. Our campaign of national advertising, which starts March 1, will surely augment that demand and show how Dependo will surely fill that demand to the letter.

You will have many calls for Dependo. Why not stock Dependo at once and thus be able to fill orders promptly. Our proposition to dealers means dollars to you. Write us today for full particulars and catalog.

C. F. ROPER & CO., Hopedale, Mass.

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POLISHES (Continued)

METAL POLISHES (Continued)

BOBRICK Chemical Co., 111-17 S. Garey St., Los Angeles, Cal. "Radium," "E. Z. Q."

BOWMAN-EDSON Co., M. K., 64 Dey St., New York, N. Y. "Edsonia."

BRASS-NU—See Nu-Back Mfg. Co.

BRIGGS & Co., John, 45 Purchase St., Boston Mass. "Hub."

BRITE-LITE—See Pure Oil Co.

BUFFALO—See Ulrich & Co.

BULLY—See New York Oil & Grease Co.

BURNISHINE—See Paul & Co.

C. P.—See Chicago Polish Co.

CALLERY & Co., W. W., 188 36th St., Pittsburg, Pa. "Winterton."

CAR-BRITE—See Lord Polish Co.

CHAMBERLAIN Co., Sixth Ave. & Grant St., Pittsburg, Pa. "Desolvo."

CHEMICAL Supply Co., 1565 Merwin St., Cleveland, O.

CHICAGO Polish Co., 3715-19 Grand Ave., Chicago, Ill. "C. P."

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

CHIEF KOKOMOKO—See National Products Co.

CINCH—See American Motor Equipment Co.

CINCINNATI Oil Works Co., Cincinnati, O. "Beacon."
(See page 143.)

CLEANER Mfg. Co., 2842 Olive St., St. Louis, Mo. "Polishine."

CLEANOLA Co., Fulton Bldg., Pittsburg, Pa. "Spe-De-Shyne."

COLGAN Mfg. & Supply Co., 42 South St., New York, N. Y. "Peerless," "Crescent."

COLUMBIA—See Stevens, Frederic B.

CORLISS Chemical Co., St. Louis, Mo.

CRESCENT—See Colgan Mfg. & Supply Co.

CROWELL Chemical Co., 9 Oxford Terrace, Beverly, Mass. "Oxford," "Ajax."

CROWN Mfg. Co., Indianapolis, Ind. "Baileys."

DAY Mfg. Co., S. A., 10-12 Pearl St., Buffalo, N. Y. "Zircon."

DAZZLEINE—See American Motor Equipment Co.

DESOLVO—See Chamberlain Co.

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich. "Rogers."

DIAMOND Specialty Co., Indianapolis, Ind.
(See page 317.)

DIAMOND Wood Polish Co., Washington Trust Bldg., Washington, Pa.

DIELECTRIC Mfg. Co., 224 S. Vandeventer Ave., St. Louis, Mo.

DOZIT—See Kirk Mfg. Co.

DRAGON—See Paul & Co.

E. Z. Q.—See Bobrick Chemical Co.

EAGLE Oil & Supply Co., Boston, Mass. "Eagleine."
(See page 293.)

EAGLEINE—See Eagle Oil & Supply Co.

EAVENSON & Sons, J., Camden, N. J. "Jesco."

EDSONIA—See Bowman-Edson Co.

ERICKA Mfg. Co., 382 Liberty St., Springfield, Mass. "Shineaul."

ESSEX Paint Works, Essex, Conn.

EVER-BRITE—See Page-Lester Co.

FEINER Chemical Mfg. Co., 238 Mill St., Springfield, Mass. "Rub-Less."

FIEBING Chemical Co., 238-40 Reed St., Milwaukee, Wis. "Lusterine."

FORD & DEENEN—See Richmond & Co.

GARRATT-CALLAHAN Co., 37 S. Clinton St., Chicago, Ill.

GLAD-RAGS—See Silvex Co.

GLISTENER Mfg. Co., 622 Cypress Ave., Kansas City, Mo. "Lee's."

GLITTERSHINE—See Grady Mfg. Co.

GLO Co., 38 Heddon Pl., East Orange, N. J.

GLOBE—See Raimes & Co.

GOLD MEDAL—See Hoffman Co.

GOLDEN SCEPTRE—See Rath Mfg. Co.

GOLDEN STAR—See Morris Mfg. Co.

GOLDSHINE—See Van Tilburg Oil Co.

GRADY Mfg. Co., 509 W. 30th St., New York, N. Y. "Glittershine," "National," "Putz," "Uno," "Scouree."

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O.

HALL-THOMPSON Co., Hartford, Conn. "Wonder Worker," "Nick-E-Lo."

HARRIS Oil Co., A. W., 326 S. Water St., Providence, R. I. "Scouree."
(See page 203.)

HARVEY Chemical Co., 216 N. Fifth St., La Fayette, Ind. "American."

HAWKEYE Oil Co., Waterloo, Ia.

HEANEY Mfg. Co., 164 State St., Boston, Mass.

HERCULES Chemical Works, 1904 W. Van Buren St., Chicago, Ill. "Non-Such."

HIGHSHINE—See Rath Mfg. Co.

HINDS & Coon, 124-26 Pearl St., Boston, Mass. "Ruby-Rub."

HOFFMAN Co., Geo. Wm., 557 E. Washington St., Indianapolis, Ind. "U. S." "Gold Medal."

HOFFMAN Paint & Varnish Co., 8 Medford St., Boston, Mass. "Anchor."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whiz."

HUB—See Briggs & Co.

HYGLO—See Stanley, John T.

IDEAL—See Polish Products Co.

IMPERIAL—See Rath Mfg. Co.

INDIANAPOLIS Paint & Color Co., 118 W. Chesapeake St., Indianapolis, Ind. "Metal-Brite."

INFUSO—See Lord Polish Co.

INTERNATIONAL—See St. Louis Surfacer & Paint Co.

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

J-M METALLO—See Johns-Manville Co.

JESCO—See Eavenson & Sons.

JEWEL—See Wadsworth-Howland Co.

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Made in our "Stannum," "Buffalo Genuine" and "Detroit Special" babbitts, or to *your* specification; our "L. B. White Brass," "Standard Hard Composition," "Gear Metal," or to *your* formula.

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For Pleasure Cars
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In the same way the car which rides on a frame built by the

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gains, in the buyer's eyes, the firmly established reputation for quality and leadership that goes with the "**Hydraulic**" name. **Hydraulic Frames** are silent guarantees of quality.

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Cleveland, Ohio

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POLISHES (Continued)

METAL POLISHES (Continued)

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M Metallo."

K M C—See Karboneater Mfg. Co.

KANTBURN—See Blue Ribbon Mfg. Co.

KARBONEATER Mfg. Co., Vanadium Bldg., Pittsburg, Pa. "K M C."

KETTLER Brass Mfg. Co., 109 Fairview St., Houston, Tex. "Qck Work."

KIRK Mfg. Co., Gumbel Bldg., Kansas City, Mo. "Dozit."

KOSMOS—See Mulliken Oil Co.

LEE'S—See Glistener Mfg. Co.

LIBERTY BELL—See Bell Oil Co.

LIGHTNING Flash Specialty Co., Harrison & Garrard Aves., Cincinnati, O.

LORD Polish Co., F. T., 37 Hovey Ave., Cambridge, Mass. "Lumino," "Car-Brite," "Infuso."

LUMINO—See Lord Polish Co.

LUSTERINE—See Fiebing Chemical Co.

LUSTRE Mfg. Co., 6 N. Clark St., Chicago, Ill.

McLEAN-JONES Oil & Supply Co., 40 Indian Wharf, Boston, Mass. "Nox-All."

MACLAREN Imperial Cheese Co., Detroit, Mich. "Redio."

MAGIC—See Sweet, Charles F.

MAGICLEAN—See Schmoeger, Frederic A.

MARATHON—See New York Oil & Grease Co.

MATCHLESS Metal Polish Co., 149 Varick St., New York, N. Y. "Mexoline."

MAXINE—See Rexine Co.

METAL-BRITE—See Indianapolis Paint & Color Co.

MET-AL-INE—See Victor Mfg. Co.

MEXOLINE—See Matchless Metal Polish Co.

MEYERS—See American Metal Polish Co.

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Apex Polishine."

MODOC Co., Drexel Bldg., Philadelphia, Pa.

MONARCH—See Suydam Co.

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O. "Mooreshine."

MOORESHINE—See Moore Oil Co.

MORRIS Mfg. Co., R. W., Gumbel Bldg., Kansas City, Mo. "Golden Star."

MORRIS & Co., Richard S., Chicago, Ill.

MULLIKEN Oil Co., 200 Friend St., Boston, Mass. "Kosmos."

NARRAGANSETT Chemical Co., 155-61 Orange St., Providence, R. I. "Reflectolite."

NATIONAL—See Grady Mfg. Co.

NATIONAL Cement & Rubber Co., 341 S. St. Clair St., Toledo, O.

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

NATIONAL Products Co., 8 Courtland Blk., Kokomo, Ind. "Chief Kokomoko."

NATIONAL Valgrinok Co., 195 Church St., Newton, Mass. "Valgrinok."

NAY Chemical Co., Tom, Holden, Mo.

NEW Jersey Paint Works, Jersey City, N. J. "Bertrams."

NEW York Oil & Grease Co., 128 Maiden Lane, New York, N. Y. "Bully," "Marathon."

NICK-E-LO—See Hall-Thompson Co.

NON-SUCH—See Hercules Chemical Works.

NORTH STAR—See American Metal Polish Co.

NORTHWESTERN Chemical Co., Marietta, O. "Pioneer." (See pages 143 and 551.)

NOX-ALL—See McLean-Jones Oil & Supply Co.

NOXAL—See Noxall Polish Mfg. Co.

NOXALL Polish Mfg. Co., 1238 Belmont Ave., Philadelphia, Pa. "Noxal."

NOXON Metal Polish Co., Hoboken, N. J. (See page 547.)

NU-BACK Mfg. Co., St. Louis, Mo. "Brass-Nu."

OIL Products Co., 17 Battery Pl., New York, N. Y. "Usoline."

ORIENT Chemical Co., Gumbel Bldg., Kansas City, Mo.

OSMACO—See Schlegel Mfg. Co.

OXFORD—See Crowell Chemical Co.

PAGE-LESTER Co., 125 W. Van Buren St., Chicago, Ill. "Ever-Brite."

PATTERSON Lubricating Co., 114 Broad St., Boston, Mass.

PAUL & Co., J. C., Chicago, Ill. "Burnishine," "Dragon."

PEERLESS—See Blue Ribbon Mfg. Co.

PEERLESS—See Colgan Mfg. & Supply Co.

PENN Petroleum Co., 115-17 N. Second St., Philadelphia, Pa. "Primus."

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PIONEER—See Northwestern Chemical Co.

PIONEER Mfg. Co., 5220 Sweeney Ave., S. E., Cleveland, O. "Shino."

POLESHINE—See Cleaner Mfg. Co.

POLISH Products Co., 606 Broadway, Kansas City, Mo. "B-Brite," "Ideal."

PREMIUM—See Blue Ribbon Mfg. Co.

PRESTOSHINE—See Sheppard, W. S.

PRIMUS—See Penn Petroleum Co.

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Brite-Lite."

PURITAN Oil Co., 1218 W. 70th St., Cleveland, O.

PURITAN Soap Co., 496 Exchange St., Rochester, N. Y.

PUTZ—See Grady Mfg. Co.

QCK WORK—See Kettler Brass Mfg. Co.

RADIUM—See Bobrick Chemical Co.

RAIMES & Co., 50 Ferry St., New York, N. Y. "Globe."

RATH Mfg. Co., Hedley & Richmond Sts., Philadelphia, Pa. "Imperial," "Golden Sceptre," "Staraline," "Highshine," "Swiss."

RAYDO—See Ulrich & Co.

RAYO Co., 5 Nassau St., New York, N. Y.

RED CROSS—See Robertson & Co.

REDIO—See MacLaren Imperial Cheese Co.

REFLECTOLITE—See Narragansett Chemical Co.

Complete Index to Classification appears on Pages 8 to 22.

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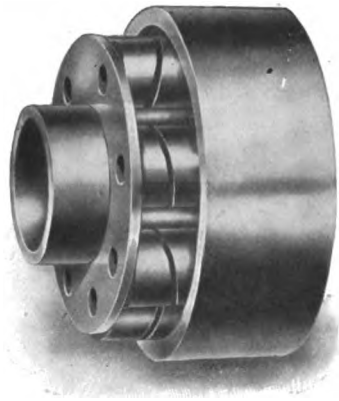

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Hyatt Roller Bearings absorb vibrations—hence reduce noise.

Hyatt Roller Bearings cushion the shocks and relieve the strain. This is because they are flexible and give under jolts and jars, still are rigid enough to carry their load and remain round.

Hyatt Rollers cannot crowd or pile up in the bearings as balls sometimes do. Hyatt Rollers will not crack or split. The sleeve, the rollers and the lining are all made from carefully selected steels which are chemically and physically tested, hardened and ground.

Hyatt Roller Bearings have a perfect system of lubrication. The rollers are hollow. They hold the oil. The spirals in the rollers alternate from right to left. This distributes the lubricant in both directions over the surface of the rollers.

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HYATT ROLLER BEARING CO.

DETROIT, MICHIGAN

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POLISHES (Continued)

METAL POLISHES (Continued)

REID Mfg. Co., W. W., 205 Milk St., Boston, Mass. "Bell," "Zip."

RELIABLE Cement Co. (E. Akron), Akron, O.

REX—See Armiger Chemical Co.

REXINE Co., Sheboygan, Wis. "Maxine."

RICHMOND & Co., C. C., 40 Batterymarch St., Boston, Mass. "Ford & Denneen."

ROBERTSON & Co., 1141 W. Madison St., Chicago, Ill. "Red Cross."

ROGERS—See Detroit White Lead Works.

ROYAL Lubricating Oil Co., 116 Broad St., New York, N. Y.

RUB-LESS—See Feiner Chemical Mfg. Co.

RUBY-RUB—See Hinds & Coon.

ST. LOUIS Surfacer & Paint Co., 26 S. Commercial St., St. Louis, Mo. "International."

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y. "Osmaco."

SCHMOEGER, Frederic A., Sterling, Ill. "Magiclean."

SCOUREE—See Grady Mfg. Co.

SCOUREE—See Harris Oil Co.

SHEPPARD, W. S., 21 Lawrence St., Newark, N. J. "Prestoshine."

SHINAL—See Adams & Elting Co.

SHINE-ALL—See Arnstein, Geo. W.

SHINE-M-UP—See Simplex Auto Specialty Co.

SHINEAUL—See Ericka Mfg. Co.

SHINITE—See Adams & Elting Co.

SHINO—See Pioneer Mfg. Co.

SILVEX Co., 60 Wall St., New York, N. Y. "Glad Rags."

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich. "Shine-m-up."

SLIKUP—See Arnold, N. B

SOLARINE Co., 153-55 N. Carpenter St., Chicago, Ill.

SOLSHINE Mfg. Co., 204 Milk St., Boston, Mass.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SPARROW—See American Oil & Disinfectant Co.

SPE-DE-SHYNE—See Cleanola Co.

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

STA-BRITE—See Atlas Auto Supply Co.

STANLEY, John T., 628-52 W. 30th St., New York, N. Y. "Hyglo."

STAR—See Bell Mfg. Co.

STARALINE—See Rath Mfg. Co.

STAY-BRIGHT Lacquer Co., 58 W. Washington St., Chicago, Ill.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. "Columbia." (See pages 535 and 536.)

SUYDAM Co., M. B., 61st & Butler Sts., Pittsburg, Pa. "Monarch."

SWEET, Charles F., 247 State St., Hartford, Conn. "Magic."

SWISS—See Rath Mfg. Co.

TRAFTON Co., F. M., 176 Federal St., Boston, Mass.

ULRICH & Co., E. North & Rose Sts., Buffalo, N. Y. "A-O-K," "Buffalo," "Raydo."

UKO—See Utility Co.

UNO—See Grady Mfg. Co.

U. S.—See Hoffman Co.

USOLINE—See Oil Products Co.

UTILITY Co., 636 W. 44th St., New York, N. Y. "Uko."

VALGRINOK—See National Valgrinok Co.

VAN Tilburg Oil Co., 2424-28 University Ave., S. E., Minneapolis, Minn. "Goldshine."

VICTOR Mfg. Co., 72 Chestnut St., Newark, N. J. "Met-al-ine."

VISCOSITY Oil Co., 1101-03 W. 37th St., Chicago, Ill.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WARREN Refining Co., 1137 W. 1th St., Cleveland, O.

WHIZ—See Hollingshead Co.

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Winnout."

WINNOUT—See Winn, Wm. R.

WINTERTON—See Callery & Co.

WONDER WORKER—See Hall-Thompson Co.

YALE—See Rostand Mfg. Co.

YOUNG, Orlando W., 130 Frelinghuysen Ave., Newark, N. J.

ZIP—See Reid Mfg. Co.

ZIRCON—See Day Mfg. Co.

PORCELAIN

ARTISTIC Porcelain Co., Trenton, N. J.

EMPIRE China Works, 142-56 Greene St., Brooklyn, N. Y.

GENERAL Porcelain Co., East Liverpool, O.

HARTFORD Faience Co., Hartford, Conn.

IMPERIAL Porcelain Works, Mulberry St. & New York Ave., Trenton, N. J.

J-D—See Jeffery-DeWitt Co.

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich. "J-D." (See pages 315 and 325.)

NATIONAL Porcelain Co., Trenton, N. J.

STAR Porcelain Co., Trenton, N. J. (See page 525.)

PRIMERS

GASOLINE ENGINE PRIMERS

(See Heaters, Mixture; also Starters)

A. & G. Mfg. Co., West Newton, Mass.

AUTOMATIC Appliance Co., 162-72 Columbus Ave., Boston, Mass. "Boston."

AUTOMATIC Device Co., 551 E. Jefferson St., Frankfort, Ind. "Economy."

BOSTON—See Automatic Appliance Co.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

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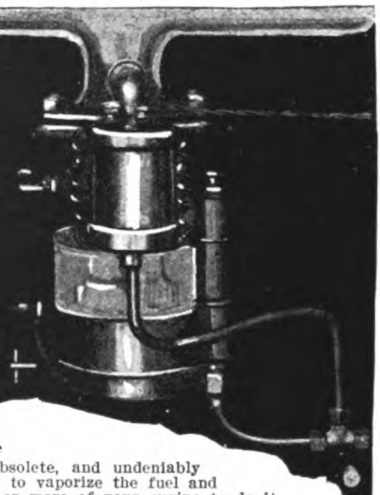
DUELEC
VAPORIZING PRIMER



ONE TURN AND OFF SHE GOES.

Hot vaporized fuel delivered to your cylinders.

Difficult Starting Overcome

Not a **cold** gas primer, cold gas priming is old, obsolete, and undeniably unsatisfactory, depending on piston friction for warmth to vaporize the fuel and bring it to condition for exploding; it takes a dozen turns or more of your engine to do it. Hot vaporized fuel explodes with the first spark; **THAT'S DUELEC.** Which do you prefer? Duelec is as good as an accident policy against broken arms. Will save your starter $50.00 worth of wear per season. Weigh carefully the merits of various primers offered. **Cold** gas primers shouldn't enter your mind.

MR. DEALER—We call your attention especially to the fact that Duelec is a patented article. This is a rattling good proposition for you to investigate. Agency contracts ready.

MR. STARTER MFGR.—Include Duelec as part of equipment. Convert your spinner into an article worthy the name of starter. *Write to-day.*

AUTOIST, MARINER, AVIATOR—Demand Duelec from your dealer or sent upon receipt of price $10.00. Make checks payable to U. S. TRAUB. Will start your engine instantaneously with gasolene, kerosene, denatured alcohol, etc. Made to last, all fittings included.

DUELEC, 14 N. B'way, YONKERS, N. Y.

PORCELAINS

Jeffery-Dewitt porcelains, by every test—heat, breakage and electrical—have repeatedly been proved to be the highest quality porcelains in the market.

JEFFERY-DEWITT CO. DETROIT, MICH.

REG. U S PAT. OFF

We guarantee these porcelains unequivocally because we know every step of their manufacture. In our own potteries our experts mix and blend the imported clays and other ingredients that years of testing have proved to be the best; in our own kilns the porcelains are baked, and our inspectors supervise the work from start to finish.

Let us study your blue-prints and submit figures

JEFFERY-DEWITT CO.
54 Butler Avenue,
Detroit, Mich.

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PRIMERS (Continued)

GASOLINE ENGINE PRIMERS (Continued)

BUCKEYE—See Central Brass & Fixture Co.

BULLOCK Engine Co., 143 N. Wabash Ave., Chicago, Ill. "Irish."

CENTRAL Brass & Fixture Co., N. Fountain Ave., Spingfield, O. "Buckeye."

CHICAGO Faucet Co., 313 S. Clinton St., Chicago, Ill.

COLONIAL Auto & Supply Co., 101 W. 66th St., New York, N. Y.

CRARY Co., 650-52 Woodward Ave., Detroit, Mich. "Jiffy."

CRONE, F. G., 334 Genesee St., Buffalo, N. Y.

CRUM-WILEY Mfg. Co., Peru, Ind. "Ideal."

DUELEC—See Traub, U. S.

ECONOMY—See Automatic Device Co.

EDGE Auto Device Co., Edgewater Park, N. J. "Neverfail."

FRANCO Mfg. Co., 119-21 E. 16th St., Chicago, Ill.

GILSON Motor Starting Co., 1407-09 N. Illinois St., Indianapolis, Ind.

HAGSTROM Bros. Mfg. Co., Lindsborg, Kans.

HILL-STAGE Co., 604 Jackson St., Anderson, Ind.

HOUSEL Mfg. Co., East Rochester, N. Y. "Savegas."

HULL Electric Co., R. C., 1822 Euclid Ave., Cleveland, O.

IDEAL—See Crum-Wiley Mfg. Co.

IDEAL—See Interstate Auto Accessory Co.

IDEAL Brass Works, Tenth & Canal Sts., Indianapolis, Ind.

INDIANA Equipment Co., State Life Bldg., Indianapolis, Ind.

INTERSTATE Auto Accessory Co., 2124 E. Washington St., Indianapolis, Ind. "Ideal."

IRISH—See Bullock Engine Co.

JIFFY—See Crary Co.

K-E-W Mfg. Co., 1733 Broadway, New York, N. Y.

KELLOGG Mfg. Co., 3 Circle St., Rochester, N. Y.
(See page 331.)

KELSEY, F. H., 1841 Euclid Ave., Cleveland, O. "Krank-Less."

KRANK-LESS—See Kelsey, F. H.

KRANK-LESS Co., Citizens Bldg., Cleveland, O.

LYDON Mfg. Co., 514 Michigan Ave., Chicago, Ill.

McVEY Mfg. Co., Dayton, O. "Start-O-Speed."
(See page 507.)

MOTOR Devices Co., Chicago, Ill. "Webb Jay."
(See page 393.)

NATIONAL Mfg. Co., 124 N. Edwards St., Kalamazoo, Mich.

NATIONAL Motor Primer Co., Best Bldg., Rock Island, Ill.

NELSON Mfg. Co., 4529 State St., Chicago, Ill.

NEVERFAIL—See Edge Auto Device Co.

OATHOUT, Chas. M., Saugerties, N. Y.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

SAVEGAS—See Housel Mfg. Co.

START-O-SPEED—See McVey Mfg. Co.

TRAUB, U. S., 14 N. Broadway, Yonkers, N. Y. "Duelec."
(See page 325.)

VIM Mfg. Co., Clark Ave. & 61st St., Cleveland, O.

WEBB JAY—See Motor Devices Co.

WELD Mfg. Co., North Chatham, Mass.

PROPS

CAR PROPS OR SUPPORTS

(See Jacks, Car Supporting)

PROTECTORS

SLEEVE AND CUFF PROTECTORS

ATLAS Specialty Mfg. Co., 217-19 N. Michigan Ave., Chicago, Ill.

B. E. Mfg. Co., 38 White St., New York, N. Y.

GORDON—See Vehicle Apron & Hood Co.

NIAGRA Auto-Cover Co., 524 W. 50th St., New York, N. Y.

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

TIRE PROTECTORS

(See Treads, Detachable; also Shoes, Inner Tire)

PULLEYS

PULLEYS AND SHEAVES

(See Sheaves and Pulleys)

PUMPS

ENGINE DRIVEN TIRE PUMPS

A.B.C.—See Artizan Brass Co.

ABELL—See Standard Thermometer Co.

ARISTO—See Eagle Mfg. Co.

ARTIZAN Brass Co., 218 N. Jefferson St., Chicago, Ill. "A.B.C."

AUTOARO Pump Co., 1854 West Ave., Buffalo, N. Y.

B. B.—See Herz & Co.

BASTIAN—See General Utility Co.

BIRD & Smith, 925 Santee St., Los Angeles, Cal. "Smiths."

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. "Vance."

COE-STAPLEY Mfg. Co., 1565 Railroad Ave., Bridgeport, Conn.

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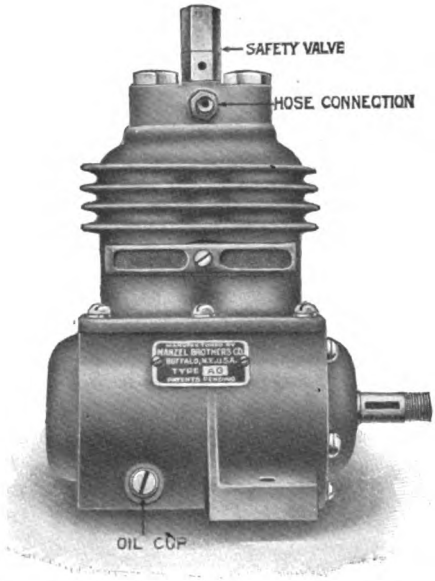
THE "MANZEL" ENGINE DRIVEN TIRE PUMP

Stops that Back Breaking Tire Pumping

The Engine Does the Work



Best for Special or Regular Equipment

Made in Three Sizes

Designed according to correct mechanical and scientific principles and in the most compact form, special attention being given to the small details so generally overlooked. Light in weight, but durable in construction. Takes up but a small amount of space on any car. Supplies absolutely pure air to the tires. All working parts are enclosed and cannot be affected by dust or dirt.

BUILT LIKE AN ENGINE

The Manzel Tire Pump is built like an engine, with heavy drop forged steel crank shaft—Grey Iron Piston and Piston Rings, accurately ground to size—Bronze Connecting Rods and Bearings—Aluminum Crank Case. There are no cams to cause trouble, nor are there any rubber, fibre or leather rings to wear out.

OILING SYSTEM

Lubricated by means of splash system similar to the oiling system of Automobile Engines—positive always—and no possibility of oil getting into the tire.

ACCURATE WORKMANSHIP

No matter how well or how accurately your engine is made, you will find the workmanship of the Manzel Tire Pump equal to it. The workmanship is absolutely first-class, all parts being accurately ground or fitted to size.

CAPACITY

Our smallest pump (Type "A") will inflate any size tire to the desired pressure in 2 to 3 minutes. Every pump tested against 200 pounds pressure before leaving the factory.

TO MANUFACTURERS—We make a specialty of large contracts, and can take care of your requirements whether you order one pump or 10,000, and can make deliveries as you want them. Our facilities are unexcelled, our plant being equipped with the very latest and best machines for this class of work.

WE ARE ALSO PREPARED TO FURNISH PUMPS FOR USE WITH AIR STARTER SYSTEMS.

Write to-day for Catalog and Prices.

MANZEL BROTHERS CO.

320 Babcock St., Buffalo, N. Y.

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PUMPS (Continued)

ENGINE DRIVEN TIRE PUMPS

(Continued)

DEWEY-ANDERSON Co., 456 Woodruff Ave., Toledo, O.
(See page 331.)

EAGLE Mfg. Co., 651-67 Blue Rock St., Cincinnati, O. "Aristo."

E-Z—See Wheaton & Co.

FOLBERTH Auto Specialty Co., 2929 Lorain Ave., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GENERAL Utility Co., 1326-30 Ogden St., Philadelphia, Pa. "Bastian."

H. M. S.—See Hartford Machine Screw Co.

HANNA—See Troy Auto Specialty Co.

HART & Widder Co., 511 W. 21st St., New York, N. Y.

HARTFORD—See Wootton & Conant.

HARTFORD Machine Screw Co., Hartford, Conn. "H. M. S."
(See page 429.)

HERZ & Co., New York, N. Y. "B. B.," "Tandem."
(See page 599.)

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill. "Utility."

KELLOGG Mfg. Co., 3 Circle St., Rochester, N. Y.
(See page 331.)

KENMORE Mfg. Co., 15 N. 40th Ave., Chicago, Ill.

KOKOMO Brass Works, Kokomo, Ind.

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

M. & L.—See McCarrell & Hawley.

MANZEL, Charles W., 319 Babcock St., Buffalo, N. Y.

MANZEL Bros. Co., 320 Babcock St., Buffalo, N. Y.
(See page 327.)

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O.

NOIL—See Taylor Mfg. Co.

O. B.—See Universal Mfg. Co.

P. T. C.—See Pacific Tucking & Mfg. Co.

PACIFIC Tucking & Mfg. Co., 471-73 18th St., Brooklyn, N. Y. "P.T.C."

PEERLESS Accessories Manufacturers, 1926 S. Wabash Ave., Chicago, Ill.

PERFECTION Auto Pump Co., Auburn, N. Y.

RACINE Engine & Machinery Co., Racine, Wis. "Two Minute."

ROHRBACHER Automatic Air Pump Co., 173 E. Water St., Portland, Ore.

SMITHS—See Bird & Smith.

STANDARD Thermometer Co., 65 Shirley St., Boston, Mass. "Abell."
(See page 435.)

TANDEM—See Herz & Co.

TAYLOR Mfg. Co., P. O. Box 485 A. R., Chicago, Ill. "Noil."
(See page 331.)

TEN EYCK Pump Co., 10 Garden St., Auburn, N. Y.

TROY Auto Specialty Co., Troy, N. Y. "Hanna."

TWO MINUTE—See Racine Engine & Machinery Co.

UNIVERSAL Mfg. Co., 308-12 Ninth St., S., Minneapolis, Minn. "O. B."

UTILITY—See Hill Pump Valve Co.

VANCE — See Chicago-Racine Aluminum, Brass & Iron Works.

WHEATON & Co., C. M. Sunbury, Ohio. "E-Z."

WOODWARD & Son, Nicholas Bldg., Toledo, O.

WOOTTON & Conant, 161 Summer St., Boston, Mass. "Hartford."

HAND TIRE PUMPS

AEOLUS—See Bridgeport Brass Co.

AERTITE—See Keystone Novelty Co.

APEX—See Buffalo Auto Accessory Mfg. Co.

ATLAS—See Bridgeport Brass Co.

BINKS—See Star Brass Works.

BISHOP-BABCOCK-BECKER Co., Cleveland, O.
(See page 519.)

BLIZZARD—See Bridgeport Brass Co.

BOSS—See Cox Brass Mfg. Co.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. "Stapley," "Æolus," "Atlas," "Windjammer," "Crown."
(See page 329.)

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

BUFFALO Auto Accessory Mfg. Co., 369 Ellicott St., Buffalo, N. Y. "Apex."

CARVER—See Osborne & Stephenson Mfg. Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Springfield."

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

COE-STAPLEY Mfg. Co., 1565 Railroad Ave., Bridgeport, Conn. "Rex," "Little Giant."

COLUMBIA—See Judd & Leland Mfg. Co.

CORDEAUX-ETTER Mfg. Corp., 11-15 McKibben St., Brooklyn, N. Y.

COX Brass Mfg. Co., Albany, N. Y. "Boss," "Handy," "Reliable."
(See page 467.)

CROWN—See Bridgeport Brass Co.

CYCLONE—See Judd & Leland Mfg. Co.

DEAD EASY—See Globe Mfg. Co.

EUREKA—See Judd & Leland Mfg. Co.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GLOBE Mfg. Co., Battle Creek, Mich. "Dead Easy."

GOULDS Mfg. Co., Seneca Falls, N. Y.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANDY—See Cox Brass Mfg. Co.

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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BRIDGEPORT BRASS CO. PRODUCTS

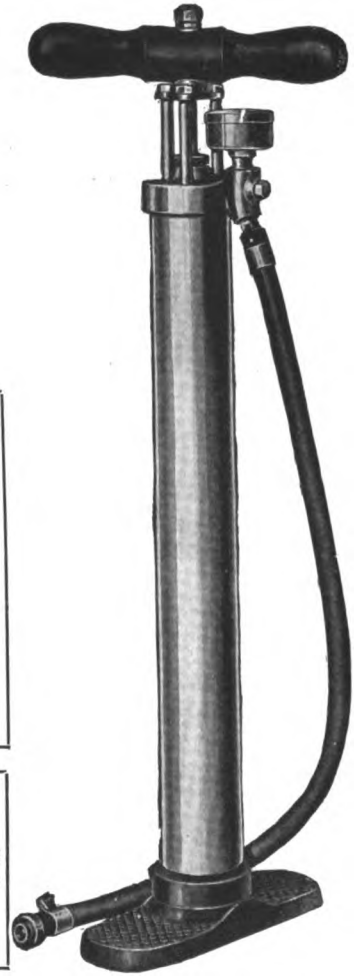
STAPLEY TIRE PUMP

Made By Bridgeport Brass Co.

A very powerful compound pump. Inflates tires quickly and easily. Strong and sturdy. Can't rust; has seamless brass tube cylinder. Won't leak; has non-leakable valves. Heavy cast base. Automatic valve opener. Nothing complicated. Accurate, guaranteed pressure gauge. We advertise this pump extensively. It is the most popular pump on the market. Carry it in stock.

LIST PRICES.

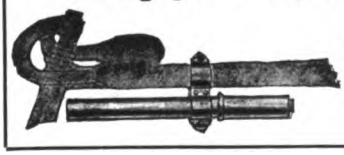
Without Gauge.....$4.00
With Gauge..... 6.00



"Search-Light" Gas Lantern

most popular bicycle lamp on the market. Makes its own gas. Won't jar out. Gives powerful light—also extensively advertised in best boys' magazines.

Bridgeport Bicycle Pumps



All classes of pumps for bicycles and motorcycles. Write for list.

BRIDGEPORT BRASS COMPANY

P. O. Station L. **BRIDGEPORT, CONN.**

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PUMPS (Continued)

HAND TIRE PUMPS (Continued)

HILL—See Judd & Leland Mfg. Co.

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill. "Utility."

IDEAL—See Noera Mfg Co.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. "Wixon." (See page 135.)

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Eureka," "Columbia," "Tornado," "Cyclone," "Hill," "Victor." (See pages 215 and 527.)

KEYSTONE Novelty Co., Columbia, Pa. "Myers Aertite."

LITTLE GIANT—See Coe-Stapley Mfg. Co.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill. "Skinner."

MYERS AERTITE—See Keystone Novelty Co.

NOERA Mfg. Co., Waterbury, Conn. "Red Devil," "Ideal," "Waterbury."

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn. "Carver." (See page 331.)

PEERLESS Accessories Manufacturers, 1926 S. Wabash Ave., Chicago, Ill.

RED DEVIL—See Noera Mfg. Co.

RELIABLE—See Cox Brass Mfg. Co.

REX—See Coe-Stapley Mfg. Co.

SAXON Mfg. Co., 205-19 Cherry St., Toledo, O.

SHAWVER Co., rear 31 W. Pleasant St., Springfield, O. "Springfield."

SKINNER—See Mayo Mfg. Co.

SPRINGFIELD—See Central Brass & Fixture Co.

SPRINGFIELD—See Shawver Co.

STAPLEY—See Bridgeport Brass Co.

STAR Brass Works, 1909-11 Fulton St., Chicago, Ill. "Binks."

STEVENS Mfg. & Supply Co., 1223-27 Wabash Ave., Chicago, Ill.

SUNDERLAND Mfg. Co., 1220 S. Michigan Ave., Chicago, Ill.

TORNADO—See Judd & Leland Mfg. Co.

TURNER Brass Works, Sycamore, Ill.

UTILITY—See Hill Pump Valve Co.

VICTOR—See Judd & Leland Mfg. Co.

WATERBURY—See Noera Mfg. Co.

WERNER-SERVICE Mfg. Co., 263 Fairmount Ave., Jersey City, N. J.

WINDJAMMER—See Bridgeport Brass Co.

WIXON—See Imperial Brass Mfg. Co.

OIL PUMPS

(See Lubricators)

STEAM AIR PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich. "Marsh."

MARSH—See American Steam Pump Co.

UNION Steam Pump Co., Battle Creek, Mich.

STEAM BOILER FEED PUMPS

AMERICAN Steam Pump Co., Battle Creek, Mich. "Marsh."

MARSH—See American Steam Pump Co.

OFELDT & Sons, August. Valley Stream, N. Y.

UNION Steam Pump Co., Battle Creek, Mich.

WATER CIRCULATING PUMPS

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

BLACKMER Rotary Pump, Power & Mfg. Co., Petoskey, Mich.

BROWN & Sharpe Mfg. Co., Promenade St., Providence, R. I.

DIXON Cascade Pump Co., Runyon St. & Badger Ave., Newark, N. J.

DOEHLER Die-Casting Co., Brooklyn, N. Y. (See page 117.)

H. M. S.—See Hartford Machine Screw Co.

HARTFORD Machine Screw Co., Hartford, Conn. "H. M. S." (See page 429.)

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

KINNEY Mfg. Co., 100 Boylston St., Boston, Mass.

LEE Co., Wm. O., Port Huron, Mich. (See page 125.)

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

LOBEE Pump & Machinery Co., 111-19 Dearborn St., Buffalo, N. Y.

OBERDORFER Brass Co., M. L., 804 E Water St., Syracuse, N. Y.

OTTUMWA-MOLINE Engine & Pump Co., Ottumwa, Ia.

SPARKS - WITHINGTON Co., Jackson, Mich. (See page 175.)

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

PURIFIERS

ACETYLENE GAS PURIFIERS

EDMUNDS & Jones Mfg. Co., 432-52 Lawton Ave., Detroit, Mich. (See page 267.)

TINKMAN Mfg. Co., Peirce City, Mo.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

PUSHES

FOOT PUSHES

(For ringing electric bells)

EDWARDS & Co., 140th & Exterior Sts., New York, N. Y.

ROUSSEAU, David, Ossining, N. Y.

Complete Index to Classification appears on Pages 8 to 22.

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KELLOGG PUMPS

USED AS REGULAR EQUIPMENT ON LEADING AUTOMOBILES

For tire inflation and self-starting The Kellogg Four Cylinder pump has the endorsement of the best car manufacturers in the country.

Kellogg Starters

Simplest and most efficient

KELLOGG ELECTRIC GARAGE PUMPS

These are now solving the pumping problems for hundreds of well managed garages. The Kellogg Electric Motor Driven Pump is a necessity in every up-to-date garage.

Write for Booklet and Prices

Kellogg Manufacturing Co.
3 Circle Street Rochester, N. Y.
New York Chicago San Francisco

The Dewey Power TirePump

$10 Complete

There are no expensive extras to buy with the Dewey—and it is the only tire pump that needs no oil.

You run no risk of oil spray to rot your inner tubes—you can't pump anything but pure air.

Inadequate air pressure means useless waste of tires. Extravagance consists in not owning a Dewey.

Adapts to any car; attaches at spark plug or pet cock. Furnished with 180 lb. high quality Dial and 12 ft. of special hose, factory tested to 1000 lbs.

$10

Guaranteed against breakage for a whole year.

The Dewey-Anderson Co.
456 Woodruff Ave., Toledo, Ohio

The Pump That Enjoys Both *Manufacturer's* and *Dealer's* Endorsement—the

TAYLOR "NOIL" TIRE PUMP

Efficient—Durable—Easy to install

The hand power pump is fast being banished—not alone by car owners but by foresighted makers of cars. In the TAYLOR, manufacturers and dealers have found an engine driven Tire Pump that they can unreservedly recommend. It is the one pump that gives clean air—without oil or vapor; *a tire saver,* as well as a labor saver. The *special brackets we supply* for different car models, make its installation extremely easy.

Write for confidential proposition to the trade.

$30 Complete

Taylor Mfg. Co.
P. O. Box 485 A. R.
CHICAGO

THE CARVER COMPOUND DOUBLE-ACTING PUMP

Compound and Double-Acting

Will inflate a tire to working pressure with less effort than any pump made.

Price $7.50

Write for Descriptive matter.

The Osborne & Stephenson Mfg. Co.
West Main St., Plainville, Conn.

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PUTTY

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

ALLENTOWN Mfg. Co., 26 S. Sixth St., Allentown, Pa.

BAKER, Wm. T., 220-32 Suydam Ave., Jersey City, N. J. "Reliable."

BELKNAP, McSherry & Moran Co., E. S., 5 Ainslie St., Brooklyn, N. Y.

BRIGGS & Co., John, 45 Purchase St., Boston, Mass.

CHICAGO White Lead & Oil Co., Green & Fulton Sts., Chicago, Ill.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

DICKS-PONTIUS Co., 28 N. Canal St., Dayton, O.

FELTON, Sibley & Co., 136-40 N. Fourth St., Philadelphia, Pa.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

RELIABLE—See Baker, Wm. T.

WILHELM Co., A., Third & Bern Sts., Reading, Pa.

RACES

BALL RACES

(See Cups, Ball)

RACKS

HAT RACKS

(See also Hangers, Hat)

BRIDGEPORT Coach Lace Co., 17th St. & Fourth Ave., New York, N. Y.

COLUMBIA—See Horstmann Co.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."

SCHLEGEL Mfg. Co., College Ave. & N. Goodman St., Rochester, N. Y.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

TRUNK RACKS

CONNECTICUT Steel & Wire Co., 57-61 Allyn St., Hartford, Conn. "Standard."

CRANMER, Harry C., 223 S. 24th St., Philadelphia, Pa.

HIGHTON & Sons Co., Wm., Nashua, N. H.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

MASCO—See Milwaukee Auto Specialty Co.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco." (See page 507.)

NOONAN Tool & Machine Works, 130-36 St. James St., Rome, N. Y.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

SMITH Co., H. Lund, 201 Paterson Ave., Paterson, N. J.

STANDARD—See Connecticut Steel & Wire Co.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

RADIATORS

WATER COOLERS OR RADIATORS

A-Z Co., 530 W. 56th St., New York, N. Y. (See page 333.)

BRISCOE Mfg. Co., Detroit, Mich.

BRISKIN-WOLSIEFER Mfg. Co., 541 N. Capitol Ave., Indianapolis, Ind.

BUSH Mfg. Co., Hartford, Conn. (See page 225.)

CANDLER Radiator Co., 1086-90 Jefferson Ave., E., Detroit, Mich. (See page 567.)

EL ARCO Radiator Co., West End Ave. & 64th St., New York, N. Y.

EMPIRE Radiator Co., Buffalo, N. Y.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

EUREKA Auto Parts Mfg. Co., 3029 Olive St., St. Louis, Mo.

FEDDERS Mfg. Co., 55 Tonawanda St., Buffalo, N. Y. (See page 345.)

GOETZ Co., 1802 Clybourn Ave., Chicago, Ill.

HARRISON Mfg. Co., Lockport, N. Y. (See page 587.)

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y. (See page 213.)

KINSEY Mfg. Co., Toledo, O. "Kinwood." (See page 153.)

KINWOOD—See Kinsey Mfg. Co.

KURTZNER Radiator Co., 2225 Ashland Rd., Cleveland, O.

LIVINGSTON Radiator & Mfg. Co., W. 52d St. & Seventh Ave., New York, N. Y. (See page 587.)

LONG Mfg Co., Detroit, Mich. (See page 225.)

McCORD Mfg. Co., Detroit, Mich. (See pages 334 and 335.)

MAYO Radiator Co., New Haven, Conn.

METAL Stamping Co., 13th St. & Boulevard Long Island City, N. Y.

NATIONAL Can Co., Detroit, Mich.

NATIONAL Radiator Co., 846 S. Canal St., Chicago, Ill.

PERFEX Radiator Co., Racine, Wis.

ROME-TURNEY Radiator Co., Rome, N. Y.

TAKE-APART-RADIATOR Co., 804 E. Washington St., Greensburg, Ind. "T-A-R-Co."

T-A-R-CO—See Take-Apart-Radiator Co.

TODD Mfg. Co., 820-24 Mary Pl., Minneapolis, Minn.

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

WRIGHT Cooler & Hood Mfg. Co., Muskegon, Mich.

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AUTOMOBILE PARTS
THE A-Z CO
NEW YORK

5TH AVE COACH

LOZIER

PRODAL-THERMO

LOCOMOBILE

GARFORD

The very fact that A-Z square tube Radiators for either pump or natural (Thermo Syphon) circulation are found on high priced cars with a National reputation, is a guarantee of their quality and efficient service.

A-Z Radiators insure greatest efficiency, direct water channels, ease of repair and ease of cleaning.

Send for our latest radiator catalog.

THE A-Z CO., 530 W 56th St. NEW YORK

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McCORD

McCord Radiators

The One Practical Radiator for Pleasure Cars, Trucks and Tractors.

Cellular and Tubular Types

There are several Reasons

Each class of service demands a Radiator built accordingly—The Pleasure Car a radiator of Beauty and Lightness, the Truck a radiator of Strength and Compactness, while the Tractor a Large, Sturdy and Durable Construction.

There's a McCord Type for Every Requirement

McCord Radiators are designed for Service, not simply built from Manufacturers' Blue Prints.

McCord Radiators are always efficient because they are designed with ample cooling surface and built by high-grade specialists who know their business.

McCord Motor Fans and McCord Force Feed Lubricators are Products worthy of your consideration.

McCord Service Means Much to the Buyer

DETROIT

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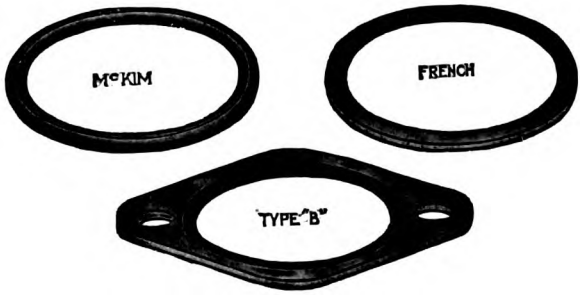
MANUFACTURING COMPANY

McKIM COPPER—ASBESTOS GASKETS



The Original Copper Asbestos Gasket

The McKim Gasket is the STANDARD for all Gasoline Motor Flanges. It is made from the best of materials, with most improved machinery which lengthens its life, and in enormous quantities. An actual minimum stock of over a half million assorted sizes of gaskets is carried on hand at all times.

Send for Standard Stock List or if your requirements are special, send in your blue prints.

Prompt Shipments—Lowest Prices Assured.

MICHIGAN

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RAILS

ROBE OR COAT RAILS

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Fire Department Supply Co., Providence, R. I.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich. (See page 341.)

AUTO Specialty Co., 89 Pearl St., Boston, Mass.

B. & B. Mfg. Co., 6526 Carnegie Ave., Cleveland, O.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

COWLES & Co., C., New Haven, Conn. (See page 177.)

COX Brass Mfg. Co., Albany, N. Y. (See page 467.)

DETLAFF, A. J., 121 Champlain St., Detroit, Mich.

DOUGLAS & LOMASON Co., Detroit, Mich.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

F & K—See Findeisen & Kropf Mfg. Co.

FINDEISEN & Kropf Mfg Co., 21st & Rockwell Sts., Chicago, Ill. "F & K", "Fit-all."

FIT-ALL—See Findeisen & Kropf Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Milwaukee." (See page 221.)

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O. (See page 153.)

MEDINA Stamping & Machine Co., Medina, N. Y.

METAL Stamping Co., 13th St., & Boulevard, Long Island City, N. Y.

MILWAUKEE—See Garage Equipment Mfg. Co

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium." (See page 507.)

MURDOCK, Jr. Co., Jas., 116 Opera Pl., Cincinnati, O.

NEW YORK Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y.

NOVELTY Mfg. Co., Waterbury, Conn. (See page 495.)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

RADIUM—See Milwaukee Auto Specialty Co.

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

SIMPLEX Specialties Co., 69 Buhl Blk., Detroit, Mich. (See page 341.)

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

SMITH Co., H. Lund, 201 Paterson Ave., Paterson, N. J.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STERLING—See Auto Accessories Mfg. Co.

TOFFLER Co., S., 341 E. 136th St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WHITE Mfg. Co., Bridgeport, Conn.

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J. (See page 271.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

RECORDERS

VEHICLE MOVEMENT RECORDERS

(For recording time vehicle is used)

BROWN, W. H., Rose Bldg., Cleveland, O. "Trafilog."

DELIVERY Supervision Co., 735 Seventh Ave., New York, N. Y. "Recordograf."

JONES Speedometer Co., Bush Terminal, Brooklyn, N. Y.

RECORDING Speedometer Co., Academy St., Newark, N. J. "Speedograph."

RECORDOGRAF—See Delivery Supervision Co.

SEARS-CROSS Co., 19-21 W. 62d St., New York, N. Y. (See page 367.)

SERVICE Recorder Co., 2344 E. 105th St., Cleveland, O. "Servis."

SERVIS—See Service Recorder Co.

SPEEDOGRAPH—See Recording Speedometer Co.

TRAFILOG—See Brown, W. H.

UNIQUE Recorder Co., Glover Bldg., Hazleton, Pa.

RECTIFIERS

ALTERNATING CURRENT RECTIFIERS

AMERICAN Battery Co., 1132-34 Fulton St., Chicago, Ill.

ASHBROOK, J. F., 2639 Emmet St., Chicago, Ill. "Johns."

Complete Index to Classification appears on Pages 8 to 22.

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That Publication serves the Manufacturer best which helps the Dealer most

MOTOR WORLD is the dealer's favorite Trade Paper. Its subscribers represent the worth-while element of all actively engaged in the sale of automobiles, accessories or supplies.

MOTOR WORLD has a definite and fixed policy, that of helping dealers to become more efficient merchandizers. Its news columns keep them informed as to happenings in the trade, but more valuable by far are Motor World's departments of "Wide Awake Merchandising," the "Reilly" stories, Systems for conducting various branches of a sales agency, etc. Some years ago when the public came to the dealer such reading would have been dry and unwelcome. Conditions have changed, however. Today the successful dealer must be a keen, aggressive merchant.

The work Motor World is doing is the most practical business help the dealers get, and it is the real reason why

Motor World Is the Dealers' Favorite Paper

Because it helps with the kind of help that is most needed. Let us see how this help serves you.

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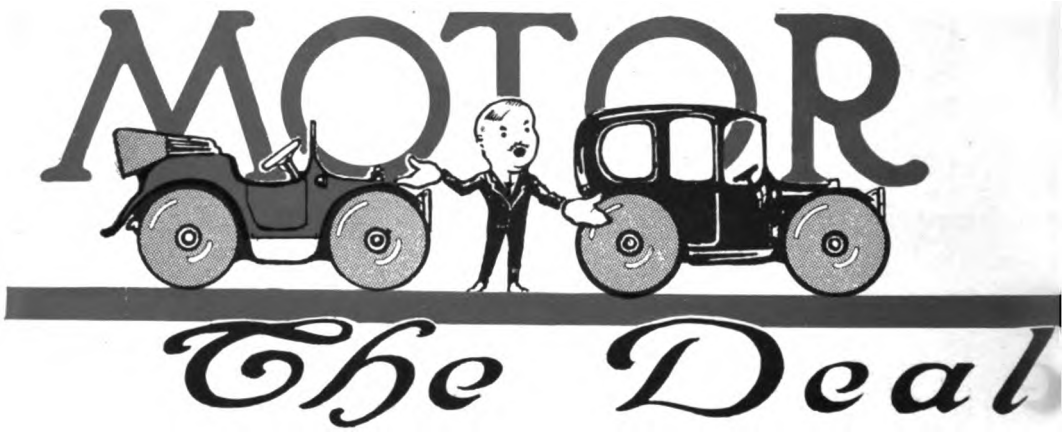

IT isn't so much what you eat that increases your vitality, but what you digest.

Just as the dealer reads Motor World for the help it gives him in the conduct of his business, there is nothing to prevent his digesting what you say to him in Motor World's Advertising Pages about your particular product. In fact, since your trade advertising is intended either to influence the dealer's buying plans or to influence his opinions in favor of your goods,

Motor World Is the Logical Medium for Your Trade Advertising

This is true whether the Dealer is your customer or whether he is your customer's customer, and the dealer effect of your advertising in Motor World is doubtless the best advertising purchase you can make.

The Publication Serves the Manufacturer

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ALL advertising is an effect — an influence. In the automobile business, any advertising campaign that is not designed to have a strong dealer effect and a strong influence upon the trade is poorly, even thoughtlessly planned and will fall far short of what it might have accomplished. This is so because advertising effort must go before and parallel to selling effort, and trade advertising should be your intimate personal connection with your actual or potential selling force.

Motor World is the Dealers' Favorite Trade Paper

because it helps them, and by so doing gives double the influence to its advertising, logically.

Advertising is done for effect. Dealer effect advertising should be done in the dealers' paper.

Best Which Helps the Dealer Most

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Fit

THE purpose it stands to accomplish — that of helping dealers to become more efficient merchandizers—is the first and greatest reason why Motor World deserves to be the dominating unit in your trade paper advertising.

How well it accomplishes its work is the soundest criterion of its fitness to occupy such a place.

Circulation and rates per page are incidental. They are invariably proportionate, one with the other, so much per line per thousand circulation, for all kinds of publications.

Kind of circulation is more nearly a true measure of strength. Then comes this: "What proportion of the total available circulation of its kind does a publication offer you." Then you begin to measure advertising value with exactness.

These are new ways of measuring advertising value. Think them over and see how they fit with your selling plans. Get Motor World's complete story and judge its fitness yourself. 90% of its readers are dealers. It is the only one that will measure up to true trade paper dimensions.

Motor World Is the Dealers' Favorite Paper

That Publication Serves the Manufacturer Best Which Helps the Dealer Most

Motor World Publishing Company

1600 BROADWAY, NEW YORK CITY

W. H. TRIPP
Western Advertising Manager
1001 Ford Building, Detroit

B. MATHEWSON
Advertising Manager
1600 Broadway, New York City

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ATTWOOD BRASS WORKS

Manufacturers of

HIGHEST GRADE

Foot Rests, Robe Rails, Tire Holders. Limousine Fittings, Side Door Handles and Parts, Lever Handles and Plates. Fittings for Automobile Hearses and Funeral Cars. Gasoline Tank and Radiator Fittings and the Attwood Gasoline Separator.
Special brass work to order. Let us quote you on your requirements.
Have you our catalog E?

SCRIBNER & BOWERY

Grand Rapids **Mich.**

The United Foundry & Machine Co., BRIDGEPORT, CONN.

Producers of the very highest class of aluminum, brass and bronze castings.

The introduction of our product into many fields of manufacture, especially into automobile construction, has been followed by the most gratifying results.
We are experts in our line and have mixtures that are all our own. Our castings are exceedingly strong, machine readily and cut free, giving the smoothest finish.
Our aim is to discover your need and fill it to your entire satisfaction.
We guarantee our material and workmanship to be superior in every respect, and depend on the quality of our castings as a chief claim for your patronage.

Service & Quality

PICTURE A

SIMPLEX AUTO TOP LIFTER

RETAIL PRICE, $2.50

New Push Button Style for any four upright top. Making it most logical one-man Top. Dealers and jobbers write us for discounts.

PICTURE B

SIMPLEX ROBE RAIL-TOP LIFTER

Perfect in its appearance and working. If used as regular equipment with Standard Four Upright Top makes only logical One-Man Top.

Manufacturers write us for our terms and request sample or personal demonstration.

SIMPLEX SPECIALTIES COMPANY

91 N

69 Buhl Block, Detroit, Mich.

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RECTIFIERS (Continued)

ALTERNATING CURRENT RECTIFIERS (Continued)

COMO Electrical Co., Spring Lake, N. J. "Hickley."

ECONOMY—See Electric Economy Co.

EDISON, Thomas A., 114 Lakeside Ave., Orange, N. J.

ELECTRIC Economy Co., Hyde Park, Mass. "Economy."

ELECTRIC Products Co., Cleveland, O. "Wotton."

ELECTRIC Storage Battery & Mfg. Co., Cincinnati, O.

GENERAL Electric Co., Schenectady, N. Y.

HICKLEY—See Como Electrical Co.

JOHNS—See Ashbrook, J. F.

MOHAWK Electric Mfg. Co., 43-47 Lawrence St., Newark, N. J. "Rollinson."

MURPHY Electricity Rectifier Co., 187 N. Water St., Rochester, N. Y.

ROLLINSON—See Mohawk Electric Mfg. Co.

SIMPLICITY—See Wilson Supply Co.

SIRCH Electrical & Testing Laboratories, 126 W. Third St., Los Angeles, Cal.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

WILSON Supply Co., 1191 Gladys Ave., Cleveland O. "Simplicity."

WOTTON—See Electric Products Co.

REEDS

HORN REEDS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y.

NONPAREIL Horn Mfg. Co., 73-75 Wooster St., New York, N. Y.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

SAXON Mfg. Co., 205-19 Cherry St., Toledo, O.

STANDARD Metal Mfg. Co., Newark, N. J. (See page 227.)

REFLECTORS

MIRROR LAMP REFLECTORS

BACHE & Co., Semon, West & Hubert Sts., New York, N. Y.

BAUSCH & Lomb Optical Co., Rochester, N. Y.

FRY Glass Co., H. C., Rochester, Pa.

HOUZE Convex Glass Co., L. J., Jane St., Point Marion, Pa.

JEFFERSON Glass Co., Follansbee, W. Va.

LANCASTER Lens Co., Lancaster, O.

MACBETH-EVANS Glass Co., Wabash Terminal Bldg., Pittsburg, Pa.

MATISSE, C. & A., 543-49 E. 116th St., New York, N. Y. (See page 343.)

REGULATORS

ACETYLENE PRESSURE OR REDUCING VALVE REGULATORS

(For use with acetylene lamps or starters: See also Controllers, Acetylene Lamps)

AUTO Lamp & Metal Works, 1906 Broadway, New York, N. Y. "L. & H."

BUCKEYE—See Central Brass & Fixture Co.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye."

CRUM-WILEY Mfg. Co., Peru, Ind.

HALLIWELL CO., 408 W. Pico St., Los Angeles, Cal. "Oie."

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

JERICHO—See Randall-Faichney Co.

L. & H.—See Auto Lamp & Metal Works.

OIE—See Halliwell Co.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

RANDALL-FAICHNEY Co., Boston, Mass. "Jericho." (See page 229.)

FUEL FEED REGULATORS

OFELDT & Sons, F. W., Nyack, N. Y.

TANK PRESSURE REGULATORS

(For regulating the exhaust pressure on gasoline or oil tanks)

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

LOCKE Regular Co., 76 North St., Salem. Mass.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

WATER LEVEL REGULATORS

OFELDT & Sons, F. W., Nyack, N. Y.

WINDOW REGULATORS

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

PERFECT Window Regulator Co., 43 Exchange Pl., New York, N. Y.

REMOVERS

CARBON REMOVERS

(See also Compounds, Carbon Removing; also Scrapers Carbon; also Machines, Motor Decarbonizing)

MICHENER, E. S., 80 Washington St., New Castle, Pa.

Complete Index to Classification appears on Pages 8 to 22.

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C. and A. MATISSE

MANUFACTURERS OF

Mangin Mirror Lenses for Auto Lamps and Searchlights

Electric Parabolas for Auto Lamps and Marine Searchlights

Plano Convex and Double Convex Lenses

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MADE BY

JAMES GRAHAM & COMPANY

BRASS FOUNDERS

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REMOVERS (Continued)

PAINT AND VARNISH REMOVERS

ACME White Lead & Color Works, 1740-1800 St. Aubin Ave., Detroit, Mich.

AD-EL-ITE—See Adams & Elting Co.

ADAMS & Elting Co., 718-26 Washington Blvd., Chicago, Ill. "Ad-el-ite."

ALBANY Chemical Co., 22 Bradway, Albany, N. Y.

BERRY Bros., Detroit, Mich.

BILCHACO—See Billings-Chapin Co.

BILLINGS-CHAPIN Co., Cleveland, O. "Bilchaco."

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston Mass. "Premium.'

BRADLEY & Vrooman Co., Chicago, Ill. "Crown."

BRIDGEPORT Wood Finishing Co., New Milford, Conn.

CALLERY & Co., W. W., 188 36th St., Pittsburg, Pa.

CHADELOID Chemical Co., 100 William St., New York, N. Y.

CHALMERS Chemical Co., 218 McWhorter St., Newark, N. J. "Phenoid."

CROWN—See Bradley & Vrooman Co.

DETROIT White Lead Works, 580-60 Milwaukee Ave., E., Detroit, Mich. "Rogers Abluent."

EBERSON Paint Co., 18th & Pine Sts., St. Louis, Mo.

ECLIPSE—See Gould & Cutler.

ENTERPRISE Paint Mfg. Co., Peoria & Van Buren Sts., Chicago, Ill. "Noxall."

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

GILLESPIE & Son, Chas. H., 19 Dey St., Jersey City, N. J. "Monarch Bull Dog."

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

GOULD & Cutler, 45 Sudbury St., Boston, Mass. "Eclipse."

HEATH & Milligan Mfg. Co., 1825-71 Seward St., Chicago, Ill.

IDOL-YUSSO—See Schlegel Mfg. Co.

JEWEL—See Wadsworth-Howland Co.

KLEAN-ITT—See Lawrence & Co.

KUT-KOTE—See Thurston Co.

LAWRENCE & Co., W. W., Pittsburg, Pa. "Klean-itt."

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa. "Mirac."

MIRAC—See Lucas & Co.

MONARCH Bull Dog—See Gillespie & Son.

NOXALL—See Enterprise Paint Mfg. Co.

PARROTT Varnish Co., 453 N. Washington Ave., Bridgeport, Conn.

PENINSULAR Paint & Varnish Co., Detroit, Mich.

PHENOID—See Chalmers Chemical Co.

PREMIUM—See Blue Ribbon Co.

ROGERS ABLUENT—See Detroit White Lead Works.

SCHLEGEL Mfg. Co., Oscar, 111 E. 12th St., New York, N. Y. "Idol-Yusso."

THURSTON, Co., F. W., 1832-34 S. Clark St., Chicago, Ill. "Kut-Kote."

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WILSON Remover Co., 115 Chestnut St. Newark, N. J. "Wonderpaste."

WONDERPASTE—See Wilson Remover Co

REPAIRERS

SPRING REPAIRERS

(See Clamps, Spring Repair)

RESTS

BOW RESTS

AMERICAN Brass Novelty Co., Grand Haven, Mich.

BARBEE Mfg. Co., 1401-05 W. Ninth St., Cleveland, O.

CAMPBELL—See Perkins Campbell Co.

CANTON Top Rest Co., 1432 E. Eighth St., Canton, O.

CLEVELAND Hardware Co., Cleveland, O.

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 379.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

EBERHARD Mfg. Co., Cleveland, O.
(See page 237.)

HOOVER Co., W. H., New Berlin, O.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell."
(See page 405.)

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 93.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.
(See page 271.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

FOOT RESTS

(See also Hassocks)

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

AETNA Brass Mfg. Co., 4800-10 Hamilton Ave., Cleveland, O.

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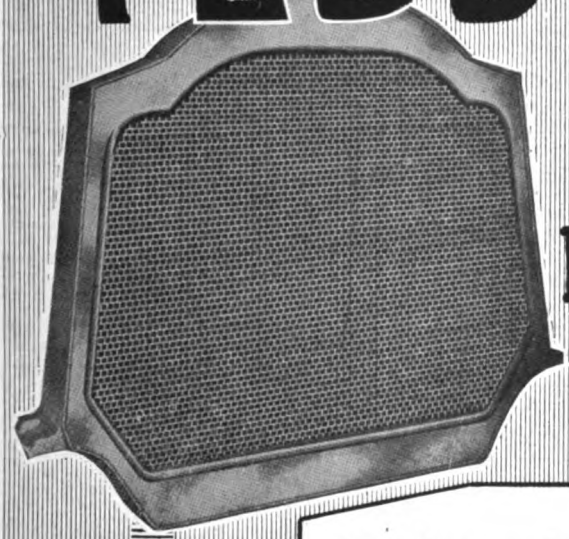
FEDDERS



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RESTS (Continued)

FOOT RESTS (Continued)

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

ALLEN Fire Department Supply Co., Providence, R. I.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich. (See page 341.)

AUTO Specialty Co., 89 Pearl St.,Boston, Mass.

B. & B. Mfg. Co., 6526 Carnegie Ave., Cleveland, O.

B. G. & M. Mfg. Co., 543 N. Franklin St., Chicago, Ill.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

COWLES & Co., C., New Haven, Conn. (See page 177.)

COX Brass Mfg. Co., Albany, N. Y. (See page 467.)

DETLAFF, A. J., 121 Champlain St., Detroit, Mich. "Rest E-Z."

DOUGLAS & Lomason Co., Detroit, Mich.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

F & K—See Findeisen & Kropf Mfg. Co.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. "F & K."

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

HARPER, Thomas, 139 Lafayette St., New York, N. Y.

HIGHTON & Sons Co., Wm., Nashua, N. H.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

KINSEY Mfg. Co., Toledo, O. (See page 153.)

MEDINA Stamping & Machine Co., Medina, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y.

NOVELTY Mfg. Co., Waterbury, Conn. (See page 495.)

REGAN & Kirwin Mfg. Co., 37 Shattuck St., Lowell, Mass.

REST E-Z—See Detlaff, A. J.

SARGENT Mfg. Co., New & Summit Sts., Newark, N. J.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

SMITH Co., H. Lund, 201 Paterson Ave., Paterson, N. J.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

TURNER Brass Works, Sycamore, Ill.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WHITE Mfg. Co., Bridgeport, Conn.

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J. (See page 271.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

HEEL RESTS

FUQUA Bros., 2418 W. Main St., Richmond, Va.

LUCAS & Son, J. L., 3 Fox St., Bridgeport, Conn.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

RETAINERS

BALL RETAINERS

BOSSERT Co., Utica, N. Y. (See page 233.)

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

STAR Ball Retainer Co., Lancaster, Pa. (See page 357.)

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 169.)

RHEOSTATS

BATTERY CHARGING RHEOSTATS

ALLEN-BRADLEY Co., Milwaukee, Wis.

CUTLER-HAMMER Mfg. Co., 12th St. & St. Paul Ave., Milwaukee, Wis.

ELECTRIC Products Co., Cleveland, O.

GENERAL Electric Co., Schenectady, N. Y.

LEONARD Electric Co., Ward, Bronxville, N. Y.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

RIMS

QUICK DETACHABLE RIMS

AMERICAN Rim Co., Sun Bldg., Detroit, Mich. "Lambert."

CLEVELAND Welding & Mfg. Co., 3205 Franklin Ave., N. W., Cleveland, O.

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RIMS

The heading to this advertisement is exactly what it implies—just **RIMS**—We manufacture rims of every description and our product consists of **RIMS** *exclusively;* consequently we are not hampered by "too many irons in the fire." We devote our entire time to "*RIM THOUGHT*," and can truthfully say that we *excel* in this particular.

We have eliminated *delays* by erecting a concrete, steel reinforced building that is absolutely fireproof—and the installation of machinery that is individually *ours* is a guarantee that specifications for rims placed with us will be protected.

JACKSON RIM COMPANY

JACKSON, MICHIGAN

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RIMS (Continued)

QUICK DETACHABLE RIMS (Continued)

IMPERIAL-MOTT Department, Flint, Mich. (See page 351.)

JACKSON Rim Co., Jackson, Mich (See page 347.)

KELSEY Wheel Co., Detroit, Mich.

LAMBERT—See American Rim Co.

MOTT Wheel Works, Utica, N. Y. (See page 349.)

STANDARD Welding Co., Cleveland, O. (See Book Mark.)

WESTON-MOTT Co., Flint, Mich. (See page 209.)

REMOVABLE OR DEMOUNTABLE RIMS

AMERICAN Rim Co., Sun Bldg., Detroit, Mich. "Lambert."

ANGLADA Co., Free Press Bldg., Detroit, Mich.

DETROIT Demountable Rim Co., 247 Jefferson Ave., Detroit, Mich. (See page 355.)

DETROIT Pneumatic Tire Co., Ford Bldg., Detroit, Mich. "Wilson."

FIRESTONE Tire & Rubber Co., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass.

FUNK, R. W., 1876 Broadway, New York, N. Y.

HOWARD Demountable Rim Co., 1850 E. State St., Trenton, N. J.

IMPERIAL-MOTT Department, Flint, Mich. (See page 351.)

JACKSON Rim Co, Jackson, Mich. (See page 347.)

KELSEY Wheel Co., Detroit, Mich.

LAMBERT—See American Rim Co.

MICHELIN Tire Co., Milltown, N. J.

MOTE Demountable & Detachable Rim Co., Wayne County Bank Bldg., Detroit, Mich.

MOTT Wheel Works, Utica, N. Y. (See page 349.)

NEWMASTIC Co., 151 W. 68th St., New York, N. Y.

PRESTO Inter-Rim Co., 883 Boylston St., Boston, Mass.

STANDARD Welding Co., Cleveland, O. "Stanweld." (See Book Mark.)

STANWELD—See Standard Welding Co.

UNITED States Tire Co. Broadway & 58th St., New York, N. Y.

WESTON-MOTT Co., Flint, Mich. (See page 209.)

WILSON—See Detroit Pneumatic Tire Co.

RUBBER STEERING WHEEL RIMS

AUTO Specialty Co., 2144 Madison Ave., Toledo, O.

DIAMOND RUBBER CO., Akron, O.

LUZERNE Rubber Co., Trenton, N. J.

RUBBERSET Co., 56 Ferry St., Newark, N. J.

STOKES Rubber Co., Jos., Trenton, N. J.

STANDARD RIMS

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

CLEVELAND Welding & Mfg. Co., 8205 Franklin Ave., N. W., Cleveland, O.

IMPERIAL-MOTT Department, Flint, Mich. (See page 351.)

KELSEY Wheel Co., Detroit, Mich.

MOTT Wheel Works, Utica, N. Y. (See page 349.)

STANDARD Welding Co., Cleveland, O. "Stanweld." (See Book Mark.)

STANWELD—See Standard Welding Co.

WESTON-MOTT Co., Flint, Mich. (See page 209.)

WOOD RIMS OR FELLOES

AMERICAN Wood Rim Co., Onaway, Mich.

BREECE Mfg. Co., Portsmouth, O.

CAMPBELL & Dann Mfg. Co., Tullahoma, Tenn.

CRANE & MacMahon, 8-10 Bridge St., New York, N. Y. "Nut." "Star."

EBERLY & Orris Mfg. Co., Mechanicsburg, Pa.

HARTWELL & Co., C. L., Chicago Heights, Ill.

JONES & Co., Phineas, Newark, N. J. (See page 505.)

KOLLER & Co., J. B., Mechanicsburg, Pa.

LEBZELTER & Son Co., Philip, 241 N. Queen St., Lancaster, Pa.

NUT—See Crane & MacMahon.

SKINNER Bending Co., J. M., Toledo, O.

STAR—See Crane & MacMahon.

TOLEDO Bending Co., Toledo, O.

TUCKER Woodwork Co., Sidney, O.

YORK Bending Works, 402 N. Queen St., York, Pa.

WOOD STEERING WHEEL RIMS

AMERICAN Wood Rim Co., Onaway, Mich.

DETROIT Auto Dash Co., 519-21 Beaubien St., Detroit, Mich. (See page 427.)

TUCKER Woodwork Co., Sidney, O.

RINGS

DUST RINGS

(See Washers, Felt)

PISTON RINGS

AMERICAN Piston Ring Co., 314-78 Jelliff Ave., Newark, N. J.

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"QUALITY" RIMS

No. 33 Q. D. DEMOUNTABLE (NEW)

OPEN **PARTLY OPEN** **CLOSED**

EASILY OPERATED

To Replace Continental and Continental Improved (Gilbert No. 3) Rims.

Does not require any change over of Bands or Fittings.

Made at this time in 4", 4 1-2" and 5" sections only.

THE MOTT WHEEL WORKS

UTICA, N. Y.

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RINGS (Continued)

PISTON RINGS (Continued)

AUTO & Accessories Mfg. Co., 816 W. North Ave., Baltimore, Md.

DUNHAM, M. L., 140 W. 52d St., New York, N. Y. "Duplex."

DUPLEX—See Dunham, M. L.

ECO Mfg. Co., 53 State St., Boston, Mass. (See page 583.)

EVER Tight Piston Ring Co., 1424-26 Chestnut St., St. Louis, Mo.

LAKE Sales Co., 1947 Broadway, New York, N. Y. "Wasson." (See page 583.)

LEAK-PROOF—See McQuay-Norris Mfg. Co.

LIGHT Inspection Car Co., Hagerstown, Ind.

McINTYRE Mfg. Co., 172-82 W. Locust St., Columbus, O.

McQUAY-NORRIS Mfg. Co., St. Louis, Mo. "Leak-Proof." (See page 351.)

MERRITT Co., S. Whyle, 311 W. 59th St., New York, N. Y.

PISTON Ring Co., Muskegon, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 305.)

VACO—See Victor Appliance Co.

VICTOR Appliance Co., Troy, N. Y. "Vaco." (See page 241.)

WAINWRIGHT & Son, W. W., Connersville, Ind. (See page 307.)

WASSON—See Lake Sales Co.

WILCOX-McKIM Co., Saginaw, Mich. (See page 197.)

RIVETS

BRASS AND COPPER RIVETS

BLAKE & Johnson Co., Waterbury, Conn.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 329.)

COBB & Drew, Plymouth, Mass.

FALLS Rivet & Machine Co., Kent, O.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y.

PLUME & Atwood Mfg. Co., 470 Bank St., Waterbury, Conn.

PROGRESSIVE Mfg. Co., Torrington, Conn.

ROME Brass & Copper Co., Rome, N. Y.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

WATERBURY Brass Goods Corp., 160 Washington Ave., Waterbury, Conn.

WATERBURY Mfg. Co., Waterbury, Conn.

COPPER RIVETS

(See Rivets, Brass)

IRON AND STEEL RIVETS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

AMERICAN Screw Co., Providence, R. I.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

COBB & Drew, Plymouth, Mass.

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

FALLS Rivet and Machine Co., Kent, O.

GARLAND Nut & Rivet Co., Bailey-Farrell Bldg., Pittsburg, Pa.

GRAND Crossing Tack Co. (Grand Crossing), Chicago, Ill.

HASSALL, John, Clay & Oakland Sts., Brooklyn, N. Y.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

MICHIGAN Bolt & Nut Works, ft. Meldrum Ave., Detroit, Mich.

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

NEWARK Rivet Works, 262 Lafayette St., Newark, N. J.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

PLYMOUTH Mills, Plymouth, Mass.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

UPSON Nut Co., Unionville, Conn.

PLATINUM RIVETS

(See Platinum)

ROBES

AUTOMOBILE LAP ROBES

ADIRONDACK—See Spear-Martin Fur Co.

AMERICAN Buffalo Robe Co., 1-7 Howell St., Buffalo, N. Y.

AUTO Robe & Rubber Co., 13 E. 16th St., New York, N. Y.

AYRES & Sons, Wm., Cumberland & Third Sts., Philadelphia, Pa.

BALLARD & Co., J. O., Malone, N. Y.

BECKMAN Co., 3167 Fulton Rd., Cleveland, O.

BISHOP Co., J. H., Wyandotte, Mich.

BURLINGTON Blanket Co., Burlington, Wis. "Sho-Fur."

CHASE & Co., L. C., Boston, Mass. (See page 439.)

CHICAGO Auto Robe Supply Co., 12-16 S. Market St., Chicago, Ill. "Perfection."

CROSBY-FRISIAN Fur Co., 571 Lyell Ave., Rochester, N. Y.

CURTIS & Von Bernuth Mfg. Co., 88 W. Broadway, New York, N. Y.

DAVIS Robe & Armor Co., 8 N. State St., Chicago, Ill.

DAWSON, J. & E., Fairhill Station, Philadelphia, Pa. "Name-On." (See page 551.)

DRAPER Bros. Co., Canton, Mass.

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The Wallace Distinctive Auto Robes

Bottom of Robe shaped to body of car.
Hangers on each side to hold up the Robe.
These hangers also designate the top of the Robe and eliminate the possibility of getting the part that belongs in the bottom of the car in your lap.

Hugh Wallace Company

Manufacturers Auto Coats, Robes and Gloves
2626 East Grand Boulevard, Detroit, Michigan

=Maximum Power=

That's one thing that interests all car owners. There's just one way to get it—insure perfect compression. You can *guarantee* perfect compression to the car owner who replaces old style piston rings with

Piston Rings

(PATENTED)

Eliminate leakage of gas and decrease carbonization. Gas can't escape down—excess oil can't come up. Made of Processed Gray Iron softer than the cylinder. They retain uniform tension and do not mar the perfect roundness of the cylinder.

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"ASK THE USER"
Write for Information
about advertising, prices, profits, etc.

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WE SUPPLY

Automobile Wheels—For Pleasure Cars or Light Commercial Trucks.

RIMS—Clincher, Quick Detachable or Demountable Types.

HUBS—Complete with Balls, Caps Etc.

SEPARATE or in Combination

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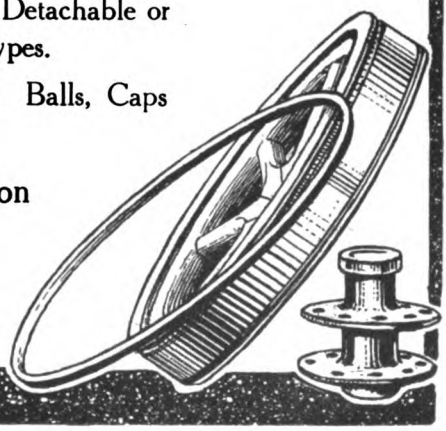

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ROBES (Continued)

AUTOMOBILE LAP ROBES (Continued)

GAUSLER & Starr Co., 249 Market St., Philadelphia, Pa.

GORDON—See Vehicle Apron & Hood Co.

KOPF-ENGEL Co., 49 Warren St., New York, N. Y.

MOORE-SMITH Co., Winthrop Sq., Boston, Mass.

NAME-ON—See Dawson, J. & E.

NEW YORK Lap Robe Co., 219 Greene St., New York, N. Y.

NEW York Leather Coat Co., 33-35 Greene St., New York, N. Y.

PERFECTION—See Chicago Auto Robe Supply Co.

REVILLON Frères, 19 W. 34th St., New York, N. Y.

RILEY & Co., Wm. B., 238 Chestnut St., Philadelphia, Pa.

SHO-FUR—See Burlington Blanket Co.

SPEAR-MARTIN Fur Co., 41 Church St., Burlington, Vt. "Adirondack."

VEHICLE Apron & Hood Co., 272 N. Fourth St., Columbus, O. "Gordon."

WALLACE Co., Hugh, 2626 E. Grand Boulevard, Detroit, Mich.
(See page 351.)

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill.

RODS

ADJUSTABLE VALVE LIFT RODS

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

APCO—See Auto Parts Co.

AUTO Parts Co., 50 Exchange Pl., Providence, R. I. "Apco."

BRIDGEPORT—See Lyford Bros.

LYFORD Bros., 625 Washington Ave., Bridgeport, Conn. "Bridgeport."

ALUMINUM RODS

(See Aluminum, Sheet)

BRAKE RODS

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 151.)

ELECTRIC Welding Products Co., Cleveland, O.
(See page 572.)

MICHIGAN Electric Welding Co., 514 Hart Ave., Detroit, Mich.
(See page 139.)

SCHWEPPE & Wilt Mfg. Co., Champlain St. & Meldrum Ave., Detroit, Mich.

BRASS RODS

(See Brass, Sheet)

CONNECTING RODS

(Finished or Machined Rods. For connecting rods in the rough—See Forgings, Drop)

BILLINGS & Spencer Co., Hartford, Conn.

GILL & Sons Forge & Machine Works, P. H., Lorraine & Otsego Sts., Brooklyn, N. Y.
(See page 447.)

KRUPP—See Prosser & Son.

OBENBERGER Drop Forge Co., Cudahy, Wis.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 353.)

TINDEL-MORRIS Co., Eddystone, Pa.

COPPER RODS

(See Brass, Sheet)

FIBRE RODS

(See Fibre, Hard)

RUBBER RODS

(See Rubber, Hard)

STEEL RODS

(See Steel)

ROLLERS

CURTAIN ROLLERS

AUTO Safety Signal Lamp Co., 604 Perry Bldg., Philadelphia, Pa. "Edw. Reukauf."
(See page 669.)

COWLES & Co., C., New Haven, Conn.
(See page 177.)

EDW. REUKAUF—See Auto Safety Signal Lamp Co.

WHITE Mfg. Co., Bridgeport, Conn.

ROPE

BRONZE WIRE ROPE OR CABLE

ELEPHANT—See Phosphor Bronze Smelting Co.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa. "Elephant."
(See page 549.)

REEVES & Co., Paul S., 1415-25 Catharine St., Philadelphia, Pa.

RIVERSIDE Metal Co., Riverside, N. J.

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"STANDARD"

PRODUCTS For Automobile Construction

CRANK SHAFTS FINISHED

Drop Forged. Slab Forged. High grade Open Hearth or any special alloy steels desired.

COLD DRAWN STEEL

Shafting—Flats. Squares—Special. Shapes for automobile work in any grade or analysis.

CONNECTING RODS COMPLETE

Made from Drop Forgings machined ready for assembly.

FINISHED MACHINE KEYS

Standard Gib Head. Round End Feathers. Standard Woodruff. Special Keys of every description.

The same extraordinary accuracy characterizes everything we make. If you use one of our products and it's satisfactory, why not try another?

STANDARD GAUGE STEEL CO.

BEAVER FALLS, PA.

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ROPE (Continued)

STEEL WIRE ROPE OR CABLE

AMERICAN Steel & Wire Co., 72 W. Adams St., Chicago, Ill.
(See page 451.)

BRODERICK & Bascom Rope Co., 805 N. Second St., St. Louis, Mo.
(See page 355.)

HAZARD Mfg. Co., Wilkes-Barre, Pa.

LESCHEN & Sons Rope Co., A., 920 N. First St., St. Louis, Mo.

MACOMBER & Whyte Rope Co., 507-09 S. Clinton St., Chicago, Ill.

ROEBLINGS Sons Co., John A., Trenton, N. J.

TRENTON Iron Co., Trenton, N. J.

WATERBURY Co., 80 South St., New York, N. Y.

WRIGHT Wire Co., Worcester, Mass.

ROPES

TOW ROPES

AUTOWLINE—See Broderick & Bascom Rope Co.

BARKER MFG. CO., 35 Ambrose St., Rochester, N. Y. "Rochester."

BRODERICK & Bascom Rope Co., 805 N. Second St., St. Louis, Mo. "Autowline."
(See page 355.)

HERCULES—See Leschen & Sons Rope Co.

HOGARTY, Edward, Unionville, Conn.

LESCHEN & Sons Rope Co., A., 920 N. First St., St. Louis, Mo. "Hercules."

ROCHESTER—See Barker Mfg. Co.

RUBBER

HARD RUBBER

(Sheet, Rod and Tube)

AMERICAN Hard Rubber Co., 9 Mercer St., New York, N. Y.

DIAMOND Rubber Co., Akron, O.

LUZERNE Rubber Co., Trenton, N. J.

SIEMON Hard Rubber Co., Bridgeport, Conn.

STOKES Rubber Co., Jos., Trenton, N. J.

WILKIE Rubber Mfg. Co., Lynn, Mass.

SCRAPERS

CARBON SCRAPERS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo.
(See page 355.)

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

FOOT SCRAPERS

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O.

SIMPSON Specialty Co., 179 W. Maple St., Columbus, O.

SCREENS

HORN SCREENS

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 227.)

SCREW-EYES

BRASS AND IRON SCREW-EYES

BROOKS & Sons, M. S., Chester, Conn.

JENCKES Mfg. Co., E., 28 Union St., Worcester, Mass.

SARGENT & Co., Water & Wallace Sts., New Haven, Conn.

WIRE Goods Co., 28 Union St., Worcester, Mass.

SCREWS

CAP AND SET SCREWS

ALLEN Mfg. Co., 135 Sheldon St., Hartford, Conn.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill.
(See pages 239 and 355.)

CLARK Bros. Bolt Co., Milldale, Conn.
(See page 89.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

CRITCHLEY Machine Screw Co., Grand St., Ct., Worcester, Mass.

CURTIS Screw Co., Buffalo, N. Y.

DETROIT Screw Works, Detroit, Mich.
(See page 661.)

EASTERN Machine Screw Corp., Barclay & Truman Sts., New Haven, Conn.

FERRY Cap & Set Screw Co., 2151 Scranton Rd., Cleveland, O.

FOSTER—See New Haven Machine Screw Co.

H. & M. Screw Co., Fostoria, O.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 429.)

HASKELL Mfg. Co., Wm. H., 451 Main St., Pawtucket, R. I.

MILES, Franklin S., 205-07 Quarry St., Philadelphia, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O.
(See page 359.)

NATIONAL Sewing Machine Co., Belvidere, Ill.

NEW Haven Machine Screw Co., New Haven, Conn. "Foster."
(See page 487.)

Complete Index to Classification appears on Pages 8 to 22.

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DETROIT DEMOUNTABLE RIM

THE BEST

BECAUSE IT IS

Water and rust proof.

The lightest, at the same time as strong as the strongest.

Most quickly Demountable Rim and most quickly detached from the tire.

It is positively and accurately centered on wheel.

Most Universally used Demountable today.

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Buy neat, compact Autowline and be ready to tow or be towed when road trouble comes. It's 25 ft. of finest flexible steel rope. Weighs only five pounds, but can pull a 6000-pound car. Autowline has stood every severe touring test for years.

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Set Screws
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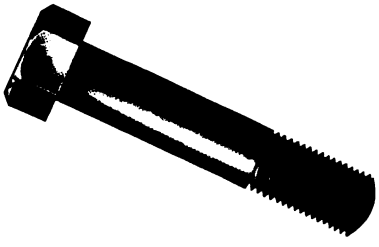
Studs
Taper Pins
Semi-Fin Nuts
Castle Nuts



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Spring Shackle Bolts
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Valve Rollers
Idler Studs

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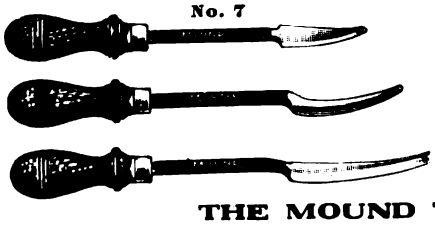
For The Automobile



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Cotter Pin Extractors.
Mound Chime Horns.
Mound Tool Rolls.

THE MOUND TOOL COMPANY
7th & Hickory Sts., St. Louis, Mo., U. S. A.

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SCREWS (Continued)

CAP AND SET SCREWS (Continued)

NIAGARA Screw Co., 20 Lock St., Buffalo, N. Y.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

PITTSBURG Screw & Bolt Co., Liberty Ave & 25th St., Pittsburg, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RHODE Island Tool Co., Providence, R. I.

ROCHESTER Machine Screw Co., Caledonia St., Rochester, N. Y.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCREW Machine Products Corp., 1012 Eddy St., Providence, R. I.

SHIMER & Sons, Samuel J., Milton, Pa.

UPSON Nut Co., Unionville, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

COACH AND LAG SCREWS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

CLARK Bros. Bolt Co., Milldale, Conn. (See page 89.)

HASKELL Mfg. Co., Wm. H., 451 Main St., Pawtucket, R. I.

LAMSON & Sessions Co., 2188 Scranton Rd., Cleveland, O.

NEW Castle Steel & Iron Co., New Castle, Pa.

OLIVER Iron & Steel Co., Pittsburg, Pa.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

LAG SCREWS

(See Screws, Coach and Lag)

MACHINE SCREWS

AMERICAN Screw Co., Providence, R. I.

ATLAS Bolt & Screw Co., 1289 Marquette Rd., Cleveland, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

DETROIT Screw Works, Detroit, Mich. (See page 661.)

HARTFORD Machine Screw Co., Hartford, Conn. (See page 429.)

INTERNATIONAL Machine & Screw Co., 172 Lyman St., Springfield, Mass.

MICHIGAN Screw Co., Lansing, Mich.

MILES, Franklin S., 205-07 Quarry St., Philadelphia, Pa.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 359.)

NATIONAL Screw & Tack Co., Stanton Ave., S. E., & C. & P. Ry., Cleveland, O.

NEW Haven Machine Screw Co., New Haven, Conn. (See page 487.)

PEERLESS Automatic Machine Co., 1970 W. 77th St., Cleveland, O.

PROGRESSIVE Mfg. Co., Torrington, Conn.

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RUSSELL & Erwin Mfg. Co. 94-98 Lafayette St., New York, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCREW Machine Products Corp., 1012 Eddy St., Providence, R. I.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

U. S. Automatic Co., Amherst, O.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

WORCESTER Machine Screw Co., 79 Beacon St., Worcester, Mass.

SET SCREWS

(See Screws, Cap and Set)

THUMB SCREWS

BILLINGS & Spencer Co., Hartford, Conn.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 239 and 355.)

DEVLIN Mfg. Co., Thos., Third & Lehigh Aves., Philadelphia, Pa.

HASKELL Mfg. Co., Wm. H., 451 Main St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

ROCHESTER Machine Screw Co., Caledonia St., Rochester, N. Y.

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

WOOD SCREWS

AMERICAN Screw Co., Providence, R. I.

ATLANTIC Screw Works, Charter Oak Ave., Hartford, Conn.

BRIDGEPORT Screw Co., Bridgeport, Conn.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

FEDERAL Screw Corp., 393 Harris Ave., Providence, R. I.

INTERNATIONAL Machine & Screw Co., 172 Lyman St., Springfield, Mass.

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FOR USE IN
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THRUSTS ON
SHAFTS,
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KNUCKLES,
FANS,
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Radial Ball Retainer for Cup and Cone Bearings.

Made in a shop devoted especially to this work by expert workmen and from the best of material.

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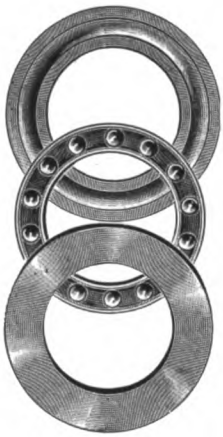

"STAR"

Ball Retainer for Thrust Bearings.

THE STAR BALL RETAINER CO.,
LANCASTER, PA.

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SCREWS (Continued)

WOOD SCREWS (Continued)

NATIONAL Screw & Tack Co., Stanton Ave. & S. E. & C. & P. Ry., Cleveland, O.

READING Screw Co., Norristown, Pa.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

RUSSELL & Erwin Mfg. Co., 94-98 Lafayette St., New York, N. Y.

SCREW MACHINE PRODUCTS

SPECIAL SCREW MACHINE PRODUCTS TO ORDER

ALEXANDER & Cox Co., Ogden & Western Aves., Chicago, Ill.

AMERICAN Ball Co., 115 Clifford St., Providence, R. I.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Pin Co., Waterbury, Conn.

ANSONIA Mfg. Co., Ansonia, Conn.

ANTHONY Screw Co., 326 Chandler St., Worcester, Mass.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 261.)

ATLAS Bolt & Screw Co., 1289 Marquette Rd., N. E., Cleveland, O.

ATLAS Brass Foundry Co., 980-90 S. Front St., Columbus, O.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 341.)

BABSON-DOW Mfg. Co., Boston, Mass.
(See page 89.)

BALL & Roller Bearing Co., Danbury, Conn.
(See page 71.)

BARNES Co., Wallace, Bristol, Conn.
(See page 673.)

BELVIDERE Screw & Machine Co., Belvidere, Ill.

BLAIR Tool & Machine Works, 521 Greenwich St., New York, N. Y.

BLAKE & Johnson Co., Waterbury, Conn.

BRIDGEPORT Metal Goods Mfg. Co., Howard Ave. & Spruce St., Bridgeport, Conn.

BROWN Cotton Gin Co., 38 Pequot Ave., New London, Conn.

BUNTING Brass & Bronze Co., 737 Spencer St., Toledo, O.
(See page 111.)

CASSADY-FAIRBANK Mfg. Co., 6106-20 La Salle St., Chicago, Ill.

CHICAGO Automatic Machine Co., Oakley Ave. & Kinzie St., Chicago, Ill.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill.
(See pages 239 and 355.)

CINCINNATI Ball Crank Co., Cincinnati, O.
(See page 151.)

CLARK Novelty Co., 380 Exchange St., Rochester, N. Y.

CLIMAX Machinery Co., 143-63 E. Morris St., Indianapolis, Ind.

CONSOLIDATED Machine Works, 6036-38 Wentworth Ave., Chicago, Ill.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

CORNWALL & Patterson Mfg. Co., Bridgeport, Conn.

CRITCHLEY Machine Screw Co., Grand Street Ct., Worcester, Mass.

CURTIS Screw Co., Buffalo, N. Y.

DEFIANCE Screw Machine Products Co., Defiance, O.

DETROIT Screw Works, Detroit, Mich.
(See page 661.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

EASTERN Machine Screw Corp., Barclay & Truman Sts., New Haven, Conn.

FARIES Mfg. Co., Decatur, Ill.

FISCHER Special Mfg. Co., 2076-78 Reading Rd., Cincinnati, O.

FRIES & Co., Buffalo, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 221.)

GARVIN Machine Co., Spring & Varick Sts., New York, N. Y.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

H. & M. Screw Co., Fostoria, O.

HAMPDEN Machine Screw Co., Birnie Ave. & Arch St., Springfield, Mass.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANSON, Henry L., 25 Union St., Worcester, Mass.

HANSON Bros., 538-48 Southington Ave., Plainville, Conn.

HARTFORD Machine Screw Co., Hartford, Conn.
(See page 429.)

HILL Co., Geo. Q., 32-34 Dorchester Ave., Boston, Mass.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

INDIANAPOLIS Tool & Mfg. Co., Indianapolis, Ind.

JEFFERY-DEWITT Co., 54 Butler Ave., Detroit, Mich.
(See pages 315 and 325.)

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

KEYLESS Lock Co., 1401 Newman St., Indianapolis, Ind.

KRAHN Mfg. Co., Enterprise Bldg., Milwaukee, Wis.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 383.)

LINK-BELT Co., Indianapolis, Ind.
(See page 431.)

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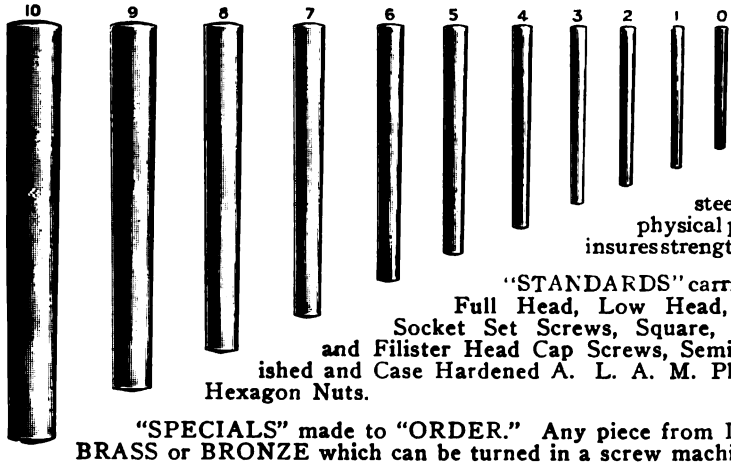
Standard Steel Taper Pins



Complete assortment of popular sizes in stock, which insures quick delivery.

Turned from steel bars of high physical properties, which insures strength and durability.

"STANDARDS" carried in "STOCK." Full Head, Low Head, Headless and Socket Set Screws, Square, Hexagon, Flat and Filister Head Cap Screws, Semi-Finished, Finished and Case Hardened A. L. A. M. Plain and Castle Hexagon Nuts.

"SPECIALS" made to "ORDER." Any piece from IRON, STEEL, BRASS or BRONZE which can be turned in a screw machine.

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More Than a Million NAMCO Parts Daily

In the Standard goods they include all the popular size V., & U.S.S. Cap and Set Screws; A. L. A. M. Screws and plain and castellated, soft and case-hardened Nuts. These are carried in completely assorted stock at factories and warehouses, and they are the *milled kind.* Standard V. and U.S.S. Nuts furnished promptly.

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New York Chicago Boston Detroit Atlanta Montreal

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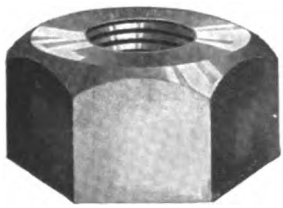
CLEVELAND and
MONTREAL



Warehouses:
NEW YORK,
77 White St.
CHICAGO,
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SCREW MACHINE PRODUCTS (Continued)

SPECIAL SCREW MACHINE PRODUCTS TO ORDER (Continued)

MACHINE Parts Co., Elyria, O.

MELLOR Mfg. Co., Harrison Ave. & Dwight St., Springfield, Mass.

METROPOLITAN Mfg. Co., Detroit, Mich.

MICHIGAN Screw Co., Lansing, Mich.

MILHOLLAND Machine Co., W. K., Tenth & Canal Sts., Indianapolis, Ind.

MOORE, George W., 15 Chardon St., Boston, Mass.

MOSSBERG Co., Frank, Attleboro, Mass. (See page 557.)

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 359.)

NATIONAL Cycle & Mfg. Co., Bay City, Mich.

NATIONAL Sewing Machine Co., Belvidere, Ill.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NEW Haven Machine Screw Co., New Haven, Conn. (See page 487.)

OHIO Metal Products Co., 39 N. Edgar St., Dayton, O.

OLSON Mfg. Co., Worcester, Mass.

PARAGON Brass Works, 224 Canal St., New York, N. Y.

PEERLESS Automatic Machine Co., 1970 W. 77th St., Cleveland, O.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

PERRY-FAY Mfg. Co., Elyria, O.

PHILADELPHIA Machine Screw Works, 624-26 Race St., Philadelphia, Pa.

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

REED & Prince Mfg. Co., Duncan Ave., Worcester, Mass.

REESE Machine & Tool Works, S., 224-30 W. Main St., Plymouth, Pa.

RHODE Island Tool Co., Providence, R. I.

ROSS Machine Co., 208 S. Fourth St., La Fayette, Ind.

RUMMEL Machine Screw Co., 1978-80 W. 77th St., Cleveland, O.

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y. (See page 601.)

ST. LOUIS Screw Co., Clarence & Bulwer Aves., St. Louis, Mo.

SCREW Machine Products Corp., 1012 Eddy St., Providence, R. I.

SECO—See Sloan Engineering Co.

SIER-BATH Co., 143 W. 54th St., New York, N. Y. (See page 533.)

SLOAN Engineering Co., 240-46 Hall St., Brooklyn, N. Y. "Seco."

SNOW-DOLE-RICHARDS Co., 9-15 Murray St., New York, N. Y.

SPARKS-WITHINGTON Co., Jackson, Mich. (See page 175.)

STANDARD Machine Screw Co., 2268 Spring Grove Ave., Cincinnati, O.

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

STERLING Machine Co., Norwich, Conn.

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

TORRINGTON Mfg. Co., Torrington, Conn.

U. S. Automatic Co., Amherst, O.

UNIVERSAL Machine Screw Co., 806 Windsor St., Hartford, Conn.

UNIVERSAL Telegraphic Co., 501 E. Preston St., Baltimore, Md.

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E., Detroit, Mich.

WATERBURY Mfg. Co., Waterbury, Conn.

WATKINS Co., D. M., Pine & Eddy Sts., Providence, R. I.

WELMADE Screw & Mfg. Co., Fitchburg, Mass.

WESTERN Automatic Machine Screw Co., 750 Lake Ave., Elyria, O. (See page 359.)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WESTERN Screw-Products Co., 3200-14 S. Seventh St., St. Louis, Mo.

WOLVERINE Screw Co., 51-53 Fort St., E., Detroit, Mich.

WORCESTER Machine Screw Co., 79 Beacon St., Worcester Mass.

SEARCHLIGHTS

ACETYLENE SEARCHLIGHTS

(See Lamps, Acetylene)

ELECTRIC SEARCHLIGHTS

(See Headlights, Electric)

SEATS

SUPPLEMENTARY SEATS

AMESBURY Brass & Foundry Co., Amesbury, Mass.

BUFFINGTON & Co., C. A., Berkshire, N. Y.

DAYTON Body Co., 618-24 Geyer St., N., Dayton, O.

EMPIRE Gear & Top Co., 207 N. 22d St., Philadelphia, Pa.

EUREKA Seat Co., 407-11 Rhode Island Ave., Buffalo, N. Y.

HILL Mfg. Co., 25-27 Fuller St., Buffalo, N. Y.

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If Your Jobber Can't Supply You

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"They look better
They wear better
They are better"

Write for our dealers' proposition.

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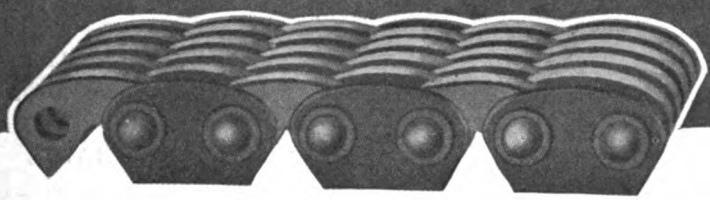
Canadian Agency

325 St. James St. Montreal

AMERICAN

HIGH SPEED CHAINS



The perfect transmission of power should be the single guide in your choice of chains. But without accuracy, honest workmanship, durability and silence you cannot get the utmost efficiency—**the transmission of power with the minimum waste.**

AMERICAN HIGH SPEED SILENT CHAINS are long-wearing, non-stretching, noiseless and efficient. Made for every possible use in automobile construction. We also make sprockets of every description. **Let us save you money and help you produce better results in power transmission.**

Send us blue prints and specifications.

AMERICAN HIGH SPEED CHAIN COMPANY

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SEATS (Continued)

SUPPLEMENTARY SEATS (Continued)

HODGE & Graves Co., Amesbury, Mass. "Luxury."
(See page 363.)

KIMBALL & Co., C. P., Chicago, Ill.
(See page 97.)

LUXURY—See Hodge & Graves Co.

McKINNON Dash Co., 252 Amherst St., Buffalo, N. Y.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I. "Ufasco."

WEISS & Son, Chas., 4715-19 Cottage Grove Ave., Chicago, Ill. "American."

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J.
(See page 271.)

WIENER-BARNET Co., 312-28 Adams St., Newark, N. J.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

GASOLINE SEPARATORS

(See Strainers, Gasoline)

SEPARATORS

BOW SEPARATORS

AMERICAN—See Weiss & Son.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMESBURY Brass & Foundry Co., Amesbury, Mass.

APPLAS Mfg. Co., 922 Fifth Ave., Moline, Ill.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 363.)

AUTO Specialties Mfg. Co., Fisher Bldg., Chicago, Ill. "Bair."

VACO—See Victor Appliance Co.

BAIR—See Auto Specialties Mfg. Co.

CLEVELAND Hardware Co., Cleveland, O.

COWLES & Co., C., New Haven, Conn.
(See page 177.)

CRANDAL, Stone & Co., Binghamton, N. Y.
(See page 379.)

DESOCO—See Detroit Socket Co.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich, "Desoco."

EBERHARD Mfg. Co., Cleveland, O.
(See page 237.)

GILLIAM Mfg. Co., Canton, O.

JONAH & George, Merrimac, Mass.

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

MURPHY Co., G. W. J., Merrimac, Mass.

NEVER-RUB—See Springfield Auto Top & Upholstering Co.

NOVELTY Mfg. Co., Waterbury, Conn.
(See page 495.)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SCHERER & Co., H., Detroit, Mich.

SMITH & Co., Jos. N., Detroit, Mich.
(See page 93.)

SPRINGFIELD Auto Top & Upholstering Co., 224-30 Dwight St., Springfield, Mass. "Never-Rub."

THOMPSON Mfg. Co., Watertown, Mass.

UFASCO—See Unique Findings & Supply Co.

SHAFTING

FLEXIBLE SHAFTING

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

COATES Clipper Mfg. Co., 237 Chandler St., Worcester, Mass.

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

P R Mfg. Co., 621 Bellevue Ave., Detroit, Mich.

STOW Flexible Shaft Co., 26th & Callowhill Sts., Philadelphia, Pa.

WEBB Mfg. Co., ft. Center St., Newark, N. J.
(See page 527.)

WHITE Dental Mfg. Co., S. S., 5-9 Union Sq., W., New York, N. Y.

SHAFTS

CAMSHAFTS

(See Camshafts, Finished)

COUNTERSHAFTS

(See Countershafts, Finished)

CRANKSHAFTS

(See Crankshafts; also Forgings, Drop)

FLEXIBLE SHAFTS

(See Shafting, Flexible)

PROPELLER SHAFTS

HARTFORD Auto Parts Co., Hartford, Conn.
(See page 137.)

KINSLER-BENNETT Co., 69 Vernon St., Hartford, Conn.
(See page 239.)

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y.
(See page 363.)

SPICER Mfg. Co., Plainfield, N. J.
(See page 241.)

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SHEAVES

SHEAVES AND PULLEYS

(For Horn and Cut-out Cables)

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

SHELLS

COPPER BOILER SHELLS

RANDOLPH-CLOWES Co., Waterbury, Conn

STEEL BOILER SHELLS

JANNEY, Steinmetz & Co., Philadelphia, Pa.
(See page 411.)

PRESSED Steel Tank Co., West Allis, Wis.

SHIELDS

WIND SHIELDS

A. B. C. O.—See Auto Brass Mfg. Co.

ACKERMAN—See Smith & Co.

AJAX—See Novelty Mfg. Co.

ALEXANDER Mfg. Co., J., 1931 Broadway, New York, N. Y.

AMERICAN Auto Top Mfg. Co., 244-50 W. 49th St., New York, N. Y.

AMERICAN Brass Products Co., Hartford, Conn. "Hercules," "Whirlwind."

ANSONIA Mfg. Co., Ansonia, Conn.

AUTO Brass Mfg. Co., 56 Friendship St., Providence, R. I. "A. B. C. O."

AUTO Parts Mfg. Co., 171 Michigan St., Milwaukee, Wis. "Badger."

AUTO Wind Shield Co., University Rd., Cambridge, Mass.

B. & B. Mfg. Co., 6526 Carnegie Ave., Cleveland, O.

BADGER—See Auto Parts Mfg. Co.

BADGER—See Wisconsin Auto Top Co.

BANKER Wind Shield Co., Ellsworth & Negley Aves., Pittsburg, Pa.

BEAN Windshield Co., 466 Main St., Malden, Mass.

BOREAS—See Page Woven Wire Fence Co.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

COLLINS & Son, G. A., Main & Church Sts., Akron, O.

COLUMBIA Tire & Top Co., 1014 Commonwealth Ave., Boston, Mass.

COLUMBUS Auto Parts Co., Columbus, O.
(See page 367.)

COX Brass Mfg. Co., Albany, N. Y.
(See page 467.)

CRANMER, Harry C., 223 S. 24th St., Philadelphia, Pa. "Philadelphia."

DIAMOND Mfg. Co., Detroit, Mich.

DOUGLAS & Lomason Co., Detroit, Mich.

DUQUESNE Auto Parts Co., 5715-17 Kirkwood St., Pittsburg, Pa.

EMPIRE Gear & Top Co., 207 N. 22d St., Philadelphia, Pa.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

FLANDERS Mfg. Co., Titusville, Pa.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Milwaukee," "Gemco."
(See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GLOVER Equipment Co., Indianapolis, Ind.
(See page 367.)

HARTFORD Windshield Mfg. Co., 1006 S. Los Angeles St., Los Angeles, Cal.

HEARD Mfg. Co., 1318 S. Main St., Los Angeles, Cal.

HERCULES—See American Brass Products Co.

HOLCOMB Co., 105 Goffe St., New Haven, Conn. "New Haven."

J. H. Tonneau Shield Co., 225 W. 49th St., New York, N. Y.

KIMBALL & Co., C. P., Chicago, Ill.
(See page 97.)

KINGSLEY—See Novelty Mfg. Co.

KINSEY Mfg. Co., Toledo, O. "Kinwood."
(See page 153.)

KINWOOD—See Kinsey Mfg. Co.

KRAHN Mfg. Co., Enterprise Bldg., Milwaukee, Wis.

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

MANHATTAN Top & Body Co., 221-23 W. 64th St., New York, N. Y.

MEDINA Stamping & Machine Co., Medina, N. Y. "Whirlwind."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

METALWOOD Mfg. Co., Leib & Wight Sts., Detroit, Mich.

MILWAUKEE—See Garage Equipment Mfg. Co.

MOORE Co., W. J., Montague Ave. & Joy St., Caro, Mich.

MURRAY & Co., P. A., Newton, Mass.

NEW HAVEN—See Holcomb Co.

NEWARK Rivet Works, 262 Lafayette St., Newark, N. J.

NOVELTY Mfg. Co., Waterbury, Conn. "Ajax," "Kingsley."
(See page 495.)

PAGE Woven Wire Fence Co., Adrian, Mich. "Boreas."

PEERLESS—See Sisson Mfg. Co.

PERFECTO Wind Deflector Co., 67 Church St., Boston, Mass.

PHILADELPHIA—See Cranmer, Harry C.

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

RANDS Mfg. Co., 67-89 Fort St., E., Detroit, Mich.

ROSTAND Mfg. Co., Milford, Conn.

SISSON Mfg. Co., 76 Main St., Buffalo, N. Y. "Peerless."

SMITH & Co., Jos. N., Detroit, Mich. "Ackerman."
(See page 93.)

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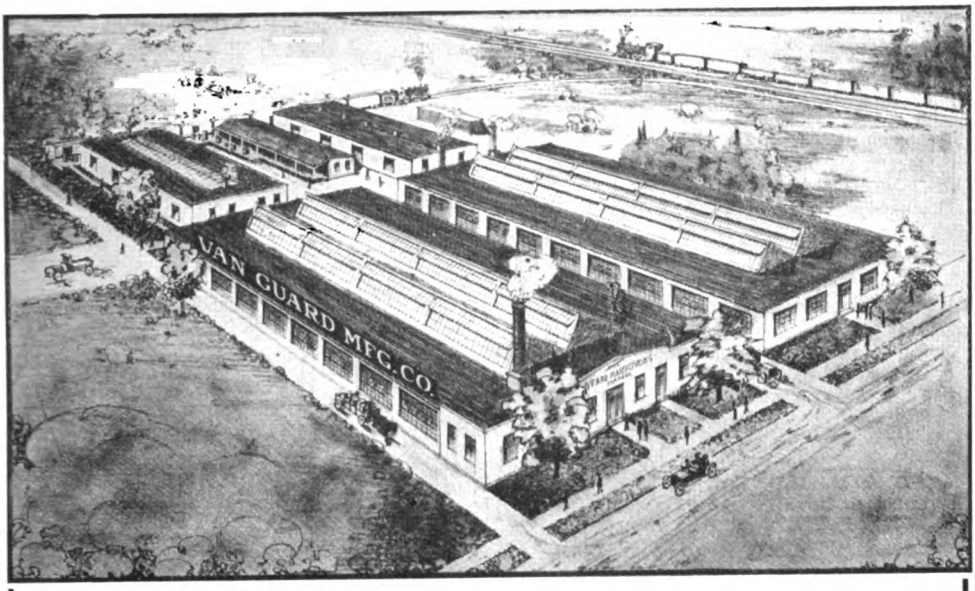

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SHIELDS (Continued)

WIND SHIELDS (Continued)

SMITH Co., H. Lund, 201 Paterson Ave., Paterson, N. J.

SPRAGUE Umbrella & Mfg. Co., Norwalk, O.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

SUPERIOR Mfg. Co., Ann Arbor, Mich.

TROY Carriage Sun Shade Co., Troy, O.

20TH Century Motor Car Supply Co., 121-25 S. La Fayette St., South Bend, Ind. "Williams."

UNION Auto Specialties Co., Brookville, Pa.

UNIVERSAL Wind Shield Co., 1614 Prairie Ave., Chicago, Ill.

VANGUARD Mfg. Co., Detroit, Mich. (See page 365.)

WALL Mfg. Co., R. C., 228-30 N. 15th St., Philadelphia, Pa.

WESTERN Auto-Body & Mfg. Co., 416-18 E. Ninth St., Los Angeles, Cal.

WHIRLWIND—See American Brass Products Co.

WHIRLWIND—See Medina Stamping & Machine Co.

WILLIAMS—See 20th Century Motor Car Supply Co.

WISCONSIN Auto Top Co., 1650 Hamilton Ave., Racine, Wis. "Badger."

SHIFTERS

AUTOMATIC GEAR SHIFTERS

(Electric and Pneumatic)

GRAY—See Research Co.

RESEARCH Co., Peoples Gas Bldg., Chicago, Ill. "Gray."

VULCAN Motor Devices Co., Land Title Bldg., Philadelphia, Pa.

SHIMS

BRASS AND COPPER SHIMS AND LINERS

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

CHANDLER Co., Napier St., Springfield, Mass.

FITZGERALD Mfg. Co., Torrington, Conn. (See page 231.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

GOODWIN & Kintz Co., Winsted, Conn.

KALES-HASKEL CO., 441-53 Lafayette Blvd., Detroit, Mich.

KICKHAEFER Mfg. Co., 199-201 Oregon St., Milwaukee, Wis.

McCORD Mfg. Co., Detroit, Mich. (See pages 334 and 335.)

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

VICTOR Mfg. & Gasket Co., Troy & 21st Sts., Chicago, Ill.

SHOCK ABSORBERS

(See also Straps, Rebound; also Springs, Supplementary)

A. V.—See Hudson Export & Import Co.

AMES—See Peacock & Co.

CONNECTICUT Shock Absorber Co., Meriden, Conn. (See page 497.)

CUSHIONET—See Walker-Moore Mfg. Co.

ECLIPSE—See Herz & Co.

FLENTJE, Ernst, 1643 Cambridge St., Cambridge, Mass. (See page 435.)

FORBES, Walter J., 243 Columbus Ave., Boston, Mass. "Knojah."

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GURNEY, C. S., Portsmouth, N. H.

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. "Truffault-Hartford." (See page 367.)

HERZ & Co., New York, N. Y. (Importers.) "Eclipse." (See page 599.)

HOOVER Spring Co., 617-37 Turk St., San Francisco, Cal.

HUDSON Export & Import Co., 140 W. 42d St., New York, N. Y. (Importers.) "A. V." (See inside front cover.)

IDEAL—See American Sales Co.

J. H. S.—See Sager Co.

KEYSTONE Shock Absorber Co., 1216-18 Liverpool St., N. S., Pittsburg, Pa.

KILGORE Mfg. Co., 727 Boylston St., Boston, Mass.

KNOJAH—See Forbes, Walter J.

LANDIS Engineering & Mfg. Co., Waynesboro, Pa.

LE TELESCO Co., Franklin Bldg., Baltimore, Md.

MARTIN Shock Absorber Co., 1301-1401 E. Slauson Ave., Los Angeles, Cal.

MASTER Suspension Co., 51 E. 42d St., New York, N. Y.

MESINGER Mfg. Co., H. & F., Austin Pl. & E. 144th St., New York, N. Y.

PEACOCK & Co., Clarence N., 1784 Broadway, New York, N. Y. "Ames." (See page 369.)

PENFIELD Shock Absorber Mfg. Co., 49 Randolph Ave., Meriden, Conn.

PETELER Shock Absorber Corp., 647 W. 50th St., New York, N. Y.

SAGER Co., J. H., 265 South Ave., Rochester, N. Y. "J. H. S."

SHIPPLEY Co., Geo. E., Pittsfield, Mass.

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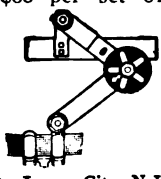

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SHOCK ABSORBERS
(Continued)

STANDARD Shock Absorber Co., Indianapolis, Ind.

STERLING Shock Absorber Co., Wabash, Ind.

TEMCO Electric Motor Co., Leipsic, O.

TRUFFAULT - HARTFORD — See Hartford Suspension Co.

WALKER-MOORE Mfg., Co., 310 Walker St., Racine, Wis. "Cushionet."

WESTINGHOUSE Air Spring Co., Pittsburg, Pa.

SHOES

INNER TIRE SHOES

(Shoes or Sleeves to be used between outer shoe and inner tube as a protector and reinforcement. For Outer Shoes or Manchons—See Sleeves, Tire Repair)

ACME—See Jackson-Eno Rubber Co.

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O.

ATLAS Rubber Co., 226-30 N. Jefferson st., Chicago, Ill.

AVON—See Gray Specialty Co.

BOSS Rubber Co., 1614 Broadway, Denver, Colo.

BROCKETT -GORHAM Co., Marion, O. "Marion."

BROWNIE—See States Mfg. Co.

BUCKEYE—See Rubber Goods Supply & Mfg. Co.

BULL DOG—See Pennsylvania Rubber Co.

BULL DOG—See Polson Bros. Mfg. Co.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 585.)

CONTINENTAL Rubber Works, Erie, Pa.
(See page 419.)

COX, David H., Chestnut St., Roselle, N. J.

DAYTON Inner-Tire & Mfg. Co., 17 N. Madison St., Dayton, O.

DOUBLE Fabric Tire Co., 60 W. Ninth St., Auburn, Ind. "Murray," "Interlock."

DYKES Co., John L. G., 222 N. State St., Chicago, Ill.

EGYPTIAN—See Polson Bros. Mfg. Co.

ESSEX Rubber Co., Trenton, N. J.

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

FISHER Mfg. Co., 1530 N St., Lincoln, Neb.

GOODYEAR Tire & Rubber Co., Akron, O.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J. "Avon."

GREAT American Rubber Co., Conshohocken, Pa.

HAGSTROM Bros. Mfg. Co., Lindsborg, Kan.

HAMPTON Mfg. Co., 1520 W. Washington St., Indianapolis, Ind. "Kant-blo."

HORSEY Mfg. Co., 6104 Euclid Ave., Cleveland, O.

INDIA Rubber Tire Co., 1461-63 Michigan Ave., Chicago, Ill.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

INNER Shoe Tire Co., Front & Allen Sts., Grand Rapids, Mich. "Innershu," "Shurhold," "Klincher."

INNERSHU—See Inner Shoe Tire Co.

INTERLOCK—See Double Fabric Tire Co.

INVINCIBLE Puncture Proof Tire Co., 53 Sabin St., Providence, R. I.

JACKSON-ENO Rubber Co., 1010 S. Main St., Los Angeles, Cal. "Acme," "Peerless," "Samson," "Leech."

JOHNSON & Co., W. L., Endicott, N. Y. "Utility."
(See page 371.)

K & W Rubber Co., Orange St., Ashland, O. "Maxotire."
(See page 371.)

K-C—See Western Tire & Rubber Co.

KANT-BLO—See Hampton Mfg. Co.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

KLINCHER—See Inner Shoe Tire Co.

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth."
(See page 663.)

LEECH—See Jackson-Eno Rubber Co.

M. & M. Mfg. Co., Akron, O.

MARION—See Brockett-Gorham Co.

MARTEL Blow-Out Protector Co., 336-38 W. 63d St., Chicago, Ill.

MAXOTIRE—See K & W Rubber Co.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MURRAY—See Double Fabric Tire Co.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Rough Rider."
(See page 167.)

O'NEILL Tire & Protector Co., W. Exchange & Water Sts., Akron, O.

PACIFIC Leather Works, 239 12th St., Oakland, Cal. "Sierra."

PEERLESS—See Jackson-Eno Rubber Co.

PEERLESS—See Polson Bros. Mfg. Co.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa. "Bull Dog."

POLSON Bros. Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog." "Egyptian," "Peerless."

ROUGH RIDER—See Niehoff & Co.

RUBBER Goods Supply & Mfg. Co., Akron, O. "Buckeye."

SAMSON—See Jackson-Eno Rubber Co.

SECURITY Reliner Co., 33 Meade St., Montgomery, N. Y.

SHUR-HOLD—See Inner Shoe Tire Co.

SIERRA—See Pacific Leather Works.

STAR—See States Mfg. Co.

STATES Mfg. Co., 1029-37 W. Adams St., Chicago, Ill. "Brownie," "Star."

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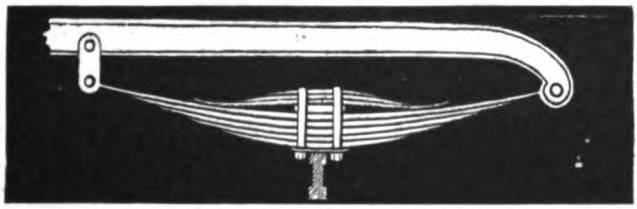

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SHOES (Continued)

INNER TIRE SHOES (Continued)

THERMOID Rubber Co., Trenton, N. J. (See page 499.)

TIRE Interlining Co., 2642 Stanton Ave., Cincinnati, O.

TRAVER Blowout Patch Co., Thoroughfare Bldg., New York, N. Y.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UTILITY—See Johnson & Co.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. "Ideal." (See page 371.)

WABAN Webbing Co., 207 Essex St., Boston, Mass.

WEARWELL Rubber Co., Kokomo, Ind.

WESTERN Automobile Supply Co., 3900 Sheridan Rd., Chicago, Ill.

WESTERN Tire & Rubber Co., 17th St. & Grand Ave., Kansas City, Mo. "K-C."

WOODWORTH—See Leather Tire Goods Co.

ZEE ZEE Tire & Rubber Co., 33d & Walnut Sts., Philadelphia, Pa.

SIGHT-FEEDS

INDEPENDENT SIGHT-FEEDS

CRUM-WILEY Mfg. Co., Peru, Ind.

ESSEX Brass Co., G. B., 480-86 Franklin St., Detroit, Mich.

HANS Motor Equipment Co., La Crosse, Wis.

KRAHN Mfg. Co., Enterprise Bldg., Milwaukee, Wis.

LAVIGNE Mfg. Co., Detroit, Mich. (See page 441.)

LEE Co., Wm. O., Port Huron, Mich. (See page 125.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McCORD Mfg. Co., Detroit, Mich. (See pages 334 and 335.)

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

PEDERSEN Lubricator Co., 636 First Ave., New York, N. Y. (See page 259.)

UNITED States Gauge Co., New York, N. Y. (See page 193.)

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

SIGNALS

REAR TRAFFIC SIGNALS

AUTO Safety Signal Lamp Co., 604 Perry Bldg., Philadelphia ,Pa. "Lassco." (See page 669.)

COWLES & Co., C., New Haven, Conn. (See page 177.)

DIRECTOR—See National Lamp & Signal Works.

FAWKES Auto Co., Minneapolis, Minn.

HUDSON Auto Lamp Works, 1648-50 Broadway, New York, N. Y. "Martin E. Z."

J-M MOBILITE—See Johns-Manville Co.

JOHNS-Manville Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M Mobilite."

LASSCO—See Auto Safety Signal Lamp Co.

MARTIN E. Z.—See Hudson Auto Lamp Works.

MOSLER & Co., A. R., Mt. Vernon, N. Y. (See page 309.)

NATIONAL Lamp & Signal Works, 327 S. La Salle St., Chicago, Ill. "Director."

QUARTETTE Automobile Signal Co., 125 W. 35th St., Los Angeles, Cal.

ROSE Mfg. Co., 910 Arch St., Philadelphia, Pa.

SILK

SPOOL SILK

MEYER & Co., John C., Lowell, Mass.

SAUQUOIT Silk Mfg. Co., Philadelphia, Pa.

UPHOLSTERY SILK

CHENEY Bros., South Manchester, Conn.

SAUQUOIT Silk Mfg. Co., Philadelphia, Pa.

SLEEVES

TIRE REPAIR SLEEVES OR BANDS

(For lacing or strapping around a tire to close a puncture or blowout. For Sleeves to be used between inner tube and outer shoe—See Shoes, Inner Tire)

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

ATLAS Rubber Co., 226-30 N. Jefferson St., Chicago, Ill.

BATAVIA Rubber Co., Batavia, N. Y.

BOSS Rubber Co., 1614 Broadway, Denver, Colo.

BUCKEYE—See Rubber Goods Supply & Mfg. Co.

BULL DOG—See Polson Bros. Mfg. Co.

CENTURY—See Niehoff & Co.

CHICAGO Leather Specialty Co., 345 W. Michigan St., Chicago, Ill.

CHICAGO Rawhide Mfg. Co., 1301 Elston Ave., Chicago, Ill. "Krome."

COLORADO Tire & Leather Co., 1340 Acoma St., Denver, Colo. "Durable."

CONTINENTAL Rubber Works, Erie, Pa. (See page 419.)

COOK & Bro., E. C., 1301-45 Carroll Ave., Chicago, Ill.

COX, David H., Chestnut St., Roselle, N. J.

DAVIS Co., W. C., 237 N. Main St., Brockton, Mass. "Star."

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"IDEAL" INNER SLEEVES AND CASINGS

REAL AUTO TIRE LIFE PROLONGERS

Equip your cars with these and save expense of extra tires. Made for real service, of standardized high grade new material.

There is only one "Ideal" in quality, construction and finish.

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Manufacturers of repair materials and automobile accessories of all kinds.

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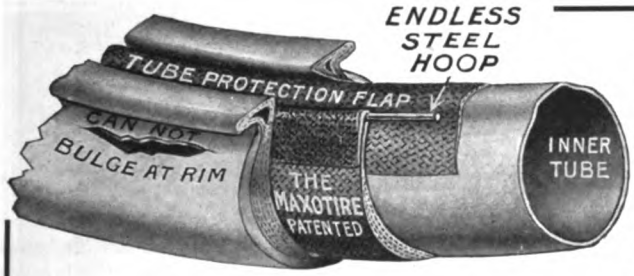
New York Store: 38 Vesey St., New York City



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MAXOTIRE

Greatest of all Tire and Tube Saving Devices—*is an "Endless" Tube Cover—Encircles the Tube,* but—*is not a "Lace-on"* or *Tire Filling Dope—Protects Tube from Pinches at Rim—Prevents Blowouts* at side *and on Tread—Made of A-No. 1 Material*—Easier to insert than an Open Joint Reliner. *Write for our* **MAXOTIRE** *Catalog* and Dealers Prices—if you are a dealer. Get our *Tire Accessory Catalog* too on our *"Endless"* Patent Reliner, Cementless Tube Patches, Cut Filler, Moulded "Rubber Tipped," Blowout Patches, Outside Boots, Tire Flaps, Cements, etc. *We are not up-starts*—have been in business 6 years. The *"K & W" Line is Reliable* and will make you the "most money."

K & W RUBBER COMPANY Orange Street **ASHLAND, OHIO**

Everything in Fabric and Leather Tire Reinforcements

Dealers:—You can't get our Quality at a lower price **anywhere.**

Our Utility reliners are made from high-grade frictioned fabric and fit perfectly.

Style F inside patch 6 ply.

Made in three sizes to fit 2½ to 5 in. tires.

Utility outside **Chrome Sole-Leather Sleeve:**

Moulded exact shape and size to outside of tire. **Guarantee** to run **1,000 miles.**

Our goods guaranted to make good or we will. YOU can give a money-back guarantee to your customers—because we stand back of you.

Write for pamphlet, giving complete line and prices—NOW.

LEATHER SLEEVE, STYLE A.

W. L. JOHNSON & CO.

Endicott, New York

62 N

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SLEEVES (Continued)

TIRE REPAIR SLEEVES OR BANDS (Continued)

DAYTON Inner-Tire & Mfg. Co., 17 N. Madison St., Dayton, O.

DOUBLE Fabric Tire Co., 60 W. Ninth St., Auburn, Ind.

DURABLE—See Colorado Tire & Leather Co.

DYKES Co., John L. G., 222 N. State St., Chicago, Ill.

ECONOMY Tread Co., 113 Lenox Ave., New York, N. Y.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ESSEX Rubber Co., Trenton, N. J.

EVERLASTING—See Legnard & Co.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

G & K—See Graton & Knight Mfg. Co.

GILBERT Mfg. Co., New Haven, Conn.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K." (See page 75.)

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

INNER Shoe Tire Co., Front & Allen Sts., Grand Rapids, Mich.

JACKSON-ENO Rubber Co., 1010 S. Main St., Los Angeles, Cal.

JOHNSON & Co., W. L., Endicott, N. Y. "Utility." (See page 371.)

K & W Rubber Co., Orange St., Ashland, O. (See page 371.)

K-C—See Western Tire & Rubber Co.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

KIMBALL Tire Case Co., 168 Broadway, Council Bluffs, Ia.

KROME—See Chicago Rawhide Mfg. Co.

LEATHER Tire Goods Co., Niagara Falls, N. Y. (See page 663.)

LEGNARD & Co., A. B., Waukegan, Ill. "Everlasting."

MESINGER Mfg. Co., H. & F., Austin Pl. & E. 144th St., New York, N. Y.

MICHELIN Tire Co., Milltown, N. J.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MODEL—See Voorhees Rubber Mfg. Co.

NATIONAL Leather Belting Co., 342 E. 38th St., New York, N. Y.

NEW York Leather Belting Co., 51 Beekman St., New York, N. Y.

NIEHOFF & Co., Paul G., 510-12 Rector Bldg., Chicago, Ill. "Century." (See page 167.)

O'NEILL Tire & Protector Co., W. Exchange & Water Sts., Akron, O.

PACIFIC Leather Works, 239 12th St., Oakland, Cal.

PEERLESS Cement Co., 39 Viaduct, Akron, O.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

POLSON Bros., Mfg. Co., 331 Southwest Blvd., Kansas City, Mo. "Bull Dog."

RUBBER Goods Supply & Mfg. Co., Akron, O. "Buckeye."

STAR—See Davis Co.

TWENTIETH Century Tire Protector Co., Midlothian, Tex.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UNIVERSAL Tire Protector Co., Angola, Ind.

UTILITY—See Johnson & Co.

VOORHEES Rubber Mfg. Co., 18-46 Bostwick Ave., Jersey City, N. J. "Model." (See page 371.)

WEARWELL Rubber Co., Kokomo, Ind.

WESTERN Tire & Rubber Co., 17th St. & Grand Ave., Kansas City, Mo. "K-C."

SOAPS

AUTOMOBILE SOAPS

(See also Polishes, Automobile)

AJAX Oil & Grease Co., 170 W. 65th St., New York, N. Y.

AMALIE—See Sonneborn Sons.

AMERICAN CROWN—See Kirk & Co.

AMERICAN Oil Co., Jackson, Mich. "Amoco."

AMERICAN Oil & Disinfectant Co., 96 Beekman St., New York, N. Y.

AMOCO—See American Oil Co.

ARCOLINE—See Atlantic Refining Co.

ARMOUR Soap Works, 31st Pl. & Benson St., Chicago, Ill. "Lustro."

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Silkup." (See page 167.)

ARROW—See Peterson Co.

ATLANTIC Refining Co., Euclid Ave. & E. 65th St., Cleveland O. "Arcoline."

AUTO Oil Co., 172 S. Water St., Jackson, Mich.

BALKAN—See Jones, C. D.

BAUM'S Castorine Co., 104 N. George St., Rome, N. Y.

BELL Oil Co., 53 E. Ferry St., St. Louis, Mo. "Liberty Bell."

BLUE RIBBON—See International Metal Polish Co.

BUCKEYE—See Davies Co.

CHAMBERLAIN Co., Sixth Ave. & Grant St., Pittsburg, Pa.

CHARIOT—See Fiske Bros. Refining Co.

CHEMICAL Supply Co., 1565 Merwin St., Cleveland, O.

CINCINNATI Oil Works Co., Cincinnati, O. (See page 143.)

CLEANEASY—See Winn, Wm. R.

CLENZO—See Puritan Oil Co.

DAVIES Co., J. P., Dayton, O. "Buckeye."

DETROIT Soap Co., Detroit, Mich.

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SALES DEPARTMENT

FOR MANUFACTURERS OF

Standard Ignition and Lighting Cable
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Atlas Reliners, Inner and Outer Boots
Howell's Perfection Decarbonizer
Sunbright Metal and Autol Body Polish
Monarch Trunk Racks
Franco Long Distance Reducing Mirrors
Gasoline Motor Primers
Automatic Gas Lamp Lighters
Electric Signal Horns
Terminals and Cable Assemblies
Pump Connections
Oil Gauges
Shock Absorbers

FACTORIES at—New York, Chicago, Toledo, Perth Amboy, N. J.; Detroit, Bridgeville, Pa.; Connersville, Ind.; Lansing, Mich.

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SOAPS (Continued)

AUTOMOBILE SOAPS (Continued)

DETROIT White Lead Works, 530-60 Milwaukee Ave., E., Detroit, Mich.

DIAMOND Specialty Co., Indianapolis, Ind.
(See page 317.)

DUPLEX—See Enterprise Oil Co.

EAGLE Oil & Supply Co., Boston, Mass. "Eoco."
(See page 293.)

EASTERN Supply Co., Hammond & Canterbury Sts., Worcester, Mass.

EASY Cleaner Mfg. Co., 1620 Broadway, Denver, Colo.

EAVENSON & Sons, J., Camden, N. J. "Jesco."

ENERGINE Refining & Mfg. Co., The Arcade, Cleveland, O.

ENTERPRISE Oil Co., 150 Chandler St., Buffalo, N. Y. "Duplex."

EOCO—See Eagle Oil & Supply Co.

ERICKA Mfg. Co., 882 Liberty St., Springfield, Mass.

FAIRCHILD & Bro., M. H., 20 W. Michigan St., Chicago, Ill.

FISK Mfg. Co., Springfield, Mass.
(See page 523.)

FISKE Bros. Refining Co., 24 State St., New York, N. Y. "Chariot."

FORD & DENNEN—See Richmond & Co.

GENERAL Oil Mfg. Co., Jersey City, N. J.

GREAT Western Oil Co., 2855 E. 37th St., Cleveland, O.

HERCULES Chemical Works, 1904 W. Van Buren St., Chicago, Ill. "Non Such."

HOLLINGSHEAD Co., R. M., Camden, N. J. "Whizoil."

HOOSIER Mfg. Co., 372 S. Illinois St., Indianapolis, Ind. "Knoxall."

HOUGHTON & Co., E. F., 240 W. Somerset St., Philadelphia, Pa.

INTERNATIONAL Metal Polish Co., Quill St. & Belt R. R., Indianapolis, Ind. "Blue Ribbon."

JESCO—See Eavenson & Sons.

JEWEL—See Wadsworth-Howland Co.

JONES, C. D., 429 Locust St., Philadelphia, Pa. "Balkan."

KENNEY Mfg. Co., F., 360-68 Dorchester Ave., Boston, Mass.

KIRK & Co., James S., 106 E. Michigan St., Chicago, Ill. "American Crown."

KLEENU Mfg. Co., 516-24 W. 25th St., New York, N. Y. "Lusteron."

KNOXALL—See Hoosier Mfg. Co.

LIBERTY BELL—See Bell Oil Co.

LIN-O—See Strunz & Son.

LOOS & Dilworth, 134 S. Front St., Philadelphia, Pa.

LUSTERON—See Kleenu Mfg. Co.

LUSTRO—See Armour Soap Works.

McLEAN-JONES Oil & Supply Co., 40 India Wharf, Boston, Mass.

MAGIC—See Zurn Co.

MARATHON—See New York Oil and Grease Co.

METEOR—See Narragansett Chemical Co.

MILLER'S Sons, Wm. P., 298-302 Hancock St., Long Island City, N. Y. "Pan-O-Lite."

MILLERS Sons Co., A. D., Columbus & Preble Aves., Pittsburg, Pa. "Perfection."

MOBO—See Stanley, John T.

MODOC Co., Drexel Bldg., Philadelphia, Pa.

MONAHAN Antiseptic Co., 8 N. Market St., Chicago, Ill. "Simplex."

MONARCH Mfg. Co., Council Bluffs, Ia.

MONOGRAM—See New York Lubricating Oil Co.

MOORE Oil Co., York St. & McLean Ave., Cincinnati, O.

MORRIS & Co., Richard S., Chicago, Ill.

MURPHYS—See Phoenix Oil Co.

NARRAGANSETT Chemical Co., 155-61 Orange St., Providence, R. I. "Meteor."

NATIONAL Oil & Supply Co., Essex & First Sts., Harrison, N. J. "Viscos."

NATIONAL Refining Co., Rose Bldg., Cleveland, O.

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram."
(See page 539.)

NEW York Oil & Grease Co., 128 Maiden Lane, New York, N. Y. "Marathon."

PAN-O-LITE—See Miller's Sons.

PENNSYLVANIA Oil Works Co., 72 Front St., New York, N. Y. "Zenith."

PERFECTION—See Millers Sons Co.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PHOENIX Oil Co., 2554 W. Fifth St., Cleveland, O. "Murphys."

PURE Oil Co., First St. & 13th Ave., S., Minneapolis, Minn. "Puritan."

PURITAN—See Pure Oil Co.

PURITAN Oil Co., 1218 W. 70th St., Cleveland, O. "Clenzo."

PURITAN Soap Co., 496 Exchange St., Rochester, N. Y.

REXINE Co., Sheboygan, Wis.

RICHMOND & Co., C. C., 40 Batterymarch St., Boston, Mass. "Ford & Dennen.

RIGHT—See Wagner Oil Co.

ROME Soap Mfg. Co., E. Dominick St., Rome, N. Y.

SIMPLEX—See Monahan Antiseptic Co.

SLIKUP—See Arnold, N. B.

SONNEBORN Sons, L., Fulton & Pearl Sts., New York, N. Y. "Amalie."

SPEARE'S Sons Co., Alden, 140 Sixth St., Boston, Mass.

STANLEY, John T., 628-52 W. 30th St., New York, N. Y. "Mobo."

STRUNZ & Son, S., 708 Bingham St., Pittsburg, Pa. "Lin-O."

SULLIVAN Oil Co., 413 Wells St., Chicago, Ill.

TROJAN—See Tropical Oil Co.

TROPICAL Oil Co., W. 70th St. & L. S. & M. S. Ry., Cleveland, O. "Trojan."

VISCOS—See National Oil & Supply Co.

WADSWORTH-Howland Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WAGNER Oil Co., 551 W. 42d St., New York, N. Y. "Right."

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NATIONAL SPRING COMPANY

MAKERS OF

Highest Grade Automobile Springs

DETROIT OFFICE
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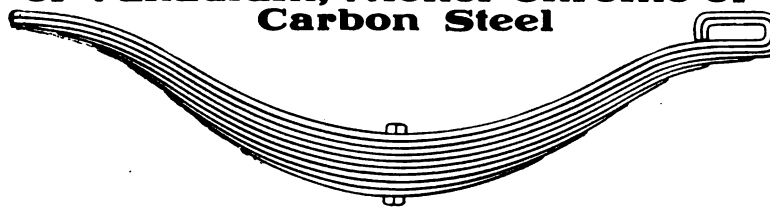
New Castle, Indiana

AUTOMOBILE SPRINGS

of Vanadium, Nickel Chrome or Carbon Steel



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TUTHILL SPRING CO. Established 1880 **766 Polk St., Chicago**

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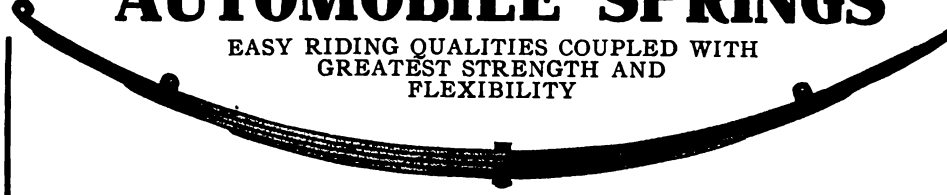
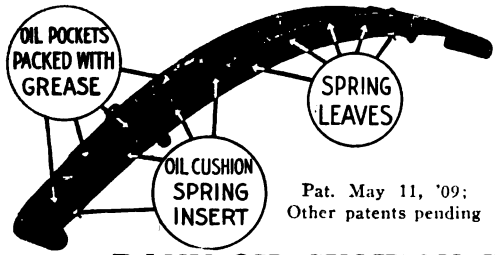
EASY RIDING QUALITIES COUPLED WITH
GREATEST STRENGTH AND
FLEXIBILITY



Made from Crucible, Nickel Chrome and Vanadium Steel.
Springs carefully tested. Heat treated. Expert workmanship, etc.

HIGGINS SPRING & AXLE COMPANY, 1314 SIXTEENTH ST., RACINE, WIS.

"OIL-CUSHIONIZE YOUR SPRINGS"



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Perfect and **Permanent** lubrication between **the Spring leaves.**

Standard equipment on the **"Borland Electric."**

DANN OIL-CUSHION SPRING INSERT CO.
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SOAPS (Continued)

AUTOMOBILE SOAPS (Continued)

WARREN Refining Co., 1137 W. 11th St., Cleveland, O.

WASHZUM—See White & Bagley Co.

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Washzum."

WHIZOIL—See Hollingshead Co.

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Cleaneasy."

YOUNG, Orlando W., 180 Frelinghuysen Ave., Newark, N. J.

ZENITH—See Pennsylvania Oil Works Co.

ZURN Co., O. F., 2736-38 N. Broad St., Philadelphia, Pa. "Magic."

HAND SOAPS AND PASTES

ALDING—See Alsten & Goulding Co.

ALSTEN & Goulding Co., 36 Foster St., Worcester, Mass. "Alding."

ARMOUR Soap Works, 31st Pl. & Benson St., Chicago, Ill.

ARNOLD, N. B., 1 Sigourney St., Brooklyn, N. Y. "Slikup." (See page 167.)

ARROW—See Peterson Co.

BARRABEE & Jones, 46 Columbus Ave., Boston, Mass. "Nu-Find."

BATES, Howard M., 1034 Fairmount Ave., Philadelphia, Pa. "Grit," "Rite Off."

BLUE Ribbon Mfg. Co., 27 Baldwin St. (Charlestown), Boston, Mass. "Peerless," "Premium."

CLEAN-PAW—See Frost, F. E.

CLEANEASY—See Winn, Wm. R.

CLEANZUM—See White & Bagley Co.

CORLISS Chemical Co., St. Louis, Mo.

DERMALENE—See Northwestern Chemical Co.

EASTERN Supply Co., Hammond & Canterbury Sts., Worcester, Mass. "Use Me."

EAVENSON & Sons, J., Camden, N. J. "Jesco."

ERICKA Mfg. Co., 882 Liberty St., Springfield, Mass. "Itsafine."

ERICKSON Soap Co., 184-88 Smith St., Hartford, Conn.

FIEBING Chemical Co., 238-40 Reed St., Milwaukee, Wis. "Presto."

FINGA-BRITE—See Rath Mfg. Co.

FLASH Chemical Co., 9 Fulton Pl., Boston, Mass.

FROST, F. E., 505 Main St., Worcester, Mass. "Kuick Klean," "Clean-Paw," "Zip."

GIT Mfg. Co., 92 Franklin St., Westfield, Mass.

GRE-SOLVENT—See Utility Co.

GRIM-OFF—See Pitts Sanitary Co.

GRIME-OFF—See Pacific Coast Borax Co.

GRIT—See Bates, Howard M.

HANDY—See New York Oil & Grease Co.

HOLLINGSHEAD Co., R. M., Camden, N. J. "Krystal Soiloff."

HOPEWELL Bros., Newton, Mass. "Paos," "Takoff." (See page 671.)

ITSAFINE—See Ericka Mfg. Co.

JESCO—See Eavenson & Sons.

JEWEL—See Wadsworth-Howland Co.

KL-ENS-OL—See Northwestern Chemical Co.

KLEENU Mfg. Co., 516-24 W. 25th St., New York, N. Y.

KLENZOLA Co., 1300 Peach St., Erie, Pa.

KRYSTAL SOILOFF—See Hollingshead Co.

KUICK-KLEAN—See Frost, F. E.

LAVA—See Waltke & Co.

MIONE Mfg. Co., 7 Ford Pl., Hartford, Conn.

MONAHAN Antiseptic Co., 8 N. Market St., Chicago, Ill.

MONOGRAM—See New York Lubricating Oil Co.

NEW York Lubricating Oil Co., 116 Broad St., New York, N. Y. "Monogram." (See page 539.)

NEW York Oil & Grease Co., 128 Maiden Lane, New York, N. Y. "Handy."

NORTHWESTERN Chemical Co., Marietta, O. "Dermalene," "Kl-Ens-Ol." (See pages 143 and 551.)

NU-FIND—See Barrabee & Jones.

PACIFIC Coast Borax Co., 100 William St., New York, N. Y. "Grime-off."

PAOS—See Hopewell Bros.

PEERLESS—See Blue Ribbon Mfg. Co.

PETERSON Co., T. J., Lees Bldg., Chicago, Ill. "Arrow."

PITT Sanitary Co., 221½ W. Exchange St., Providence, R. I. "Grim-off."

PREMIUM—See Blue Ribbon Mfg. Co.

PRESTO—See Fiebing Chemical Co.

RADIUM Compound Co., Phoenix, N. Y.

RATH Mfg. Co., Hedley & Richmond Sts., Philadelphia, Pa. "Finga-Brite."

REXINI Co., Sheboygan, Wis.

RITE-OFF—See Bates, Howard M.

SHOFO—See Stanley, John T.

SKAT Co., 791 Park St., Hartford, Conn.

SKIDOO—See Yeazell-Goldstein Corp.

SLIKUP—See Arnold, N. B.

STANLEY, John T., 628-52 W. 30th St., New York, N. Y. "Shofo."

TAKOFF—See Hopewell Bros.

TATLOCK Bros., Rochester, N. Y. "Tat's."

TAT'S—See Tatlock Bros.

USE ME—See Eastern Supply Co.

UTILITY Co., 636 W. 44th St., New York, N. Y. "Gre-Solvent."

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WALTKE & Co., Wm., Grand Ave. & Second St., St. Louis, Mo. "Lava."

WHITE & Bagley Co., 100 Foster St., Worcester, Mass. "Cleanzum."

WINN, Wm. R., 143 Maiden Lane, New York, N. Y. "Cleaneasy."

YEAZELL-GOLDSTEIN Corp., 489 Buttles Ave., Columbus, O. "Skidoo."

ZIP—See Frost, F. E.

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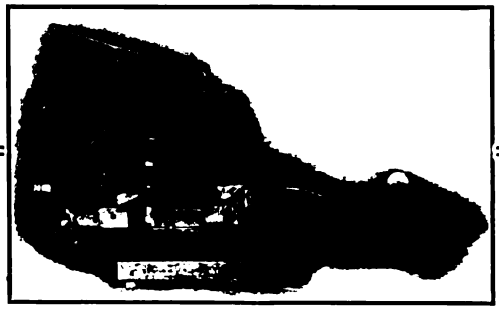
MODEL  MOTORS

A car with a poor motor is about as useful for strenuous work as a man with a weak heart.

Remember this—you may use the finest axles in the land, the strongest wheels made, the highest quality of every other part—but if the motor hasn't the POWER—your car will earn **anything** but a favorable reputation.

Model motors are the successful evolution of many years' experience in the motor building field. Power and silence are built into them. **Excessive weight** is eliminated and **strength increased** by correct design.

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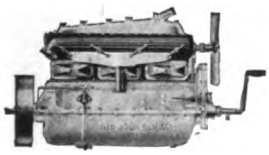
"The Part that Sells the Car"

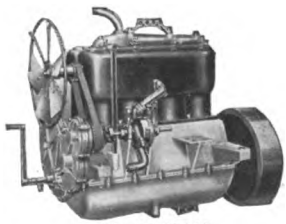
Sells Itself Against All Competition

We have made frequent reference to experience and workmanship as two of the most important factors in the making of a silent, efficient, powerful and durable motor. But "experience" and "workmanship" are words that anybody can get put into type. When *we* use them they mean much, and we ask any manufacturer of pleasure cars or trucks who contemplates the purchase of motors to put ours to a scientific and practical test in comparison with others — any or all.



Model SS-3 "Little Six"

THE BUDA COMPANY
FACTORY, HARVEY, ILL.
(Chicago Suburb)
Address all correspondence to our
FACTORY REPRESENTATIVES
BRANDENBURG AND COMPANY
FORD BUILDING, DETROIT



Model "Q"

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SOCKETS

BOW SOCKETS

(For Slat Irons—See Irons, Slat)

AJAX—See Cortland Forging Co.

ASHTABULA Bow Socket Co., Ashtabula, O.

CLEVELAND Hardware Co., Cleveland, O.

CORTLAND Carriage Goods Co., Cortland, N. Y.

CORTLAND Forging Co., Cortland, N. Y. "Ajax."

CRANDAL, Stone & Co., Binghamton, N. Y. "Pioneer." (See page 379.)

DESOCO—See Detroit Socket Co.

DETROIT Forging Co., 120 Mt. Elliott St., Detroit, Mich.

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

GENERAL Drop Forge Co., 1740 Elmwood Ave., Buffalo, N. Y. (See page 187.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MICHIGAN Bow Socket Co., 607-09 Fort St., W., Detroit, Mich.

PANTASOTE Co., 11 Broadway, New York, N. Y. "Solitaire."

PIONEER—See Crandal, Stone & Co.

SCHERER & Co., H., Detroit, Mich.

SOLITAIRE—See Pantasote Co.

ELECTRIC LAMP SOCKETS

ANCHOR—See Metal Specialties Mfg. Co.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill.

CONNECTICUT Telephone & Electric Co., Meriden, Conn. (See page 497.)

CULVER-STEARNS Mfg. Co., Worcester, Mass. (See page 243.)

EMPIRE—See McCandless & Co.

GENERAL Electric Co., Schenectady, N. Y.

McCANDLESS & Co., H. W., 67 Park Pl., New York, N. Y. "Empire."

METAL Specialties Mfg. Co., 736-38 W. Monroe St., Chicago, Ill. "Anchor."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

WARNE-DOUGLAS Co., Bronson, Mich.

SPADES

COLLAPSIBLE SPADES AND SHOVELS

BARNARD Specialty Co., 3300 Maple Ave., Los Angeles, Cal.

WAYNESBURG Pressed Steel Co., Waynesburg, Pa.

SPEEDOMETERS

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

AUTOMATIC Appliance Co., 162-72 Columbus Ave., Boston, Mass.

CLEVELAND Speed Indicator Co., 2032 Euclid Ave., Cleveland, O.

CORBIN BROWN—See Corbin Screw Corp.

CORBIN Screw Corp., 219 High St., New Britain, Conn. "Corbin Brown."

DEAN Electric Co., 2515 Taylor St., Elyria, O. "Elyria-Dean." (See page 138.)

DETROIT Instrument Co., 251 E. Jefferson Ave., Detroit, Mich.

ELYRIA-DEAN—See Dean Electric Co.

EVER READY—See American Ever Ready Co.

FORSE Machine Co., Pendleton, Ind.

HOFFECKER Co., Motor Mart, Boston, Mass.

JONES Speedometer Co., Bush Terminal, Brooklyn, N. Y.

RECORDING Speedometer Co., Academy St., Newark, N. J.

SEARS-CROSS Co., 19-21 W. 62d St., New York, N. Y. (See page 367.)

STANDARD Thermometer Co., 65 Shirley St., Boston, Mass. (See page 435.)

STAR Speedometer Co., Milton, Pa.

STEWART Speedometer Corp., 1904 Diversey Blvd., Chicago, Ill.

STEWART-WARNER Speedometer Corp., Beloit, Wis. (See page 435.)

STOVER-LANG Co., 219-23 Columbus Ave., Boston, Mass.

TROY Carriage Sun Shade Co., Troy, O.

VEEDER Mfg. Co., 22 Sargeant St., Hartford, Conn.

SOLUTION

PRIMING SOLUTION

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Polar." (See page 507.)

POLAR—See Milwaukee Auto Specialty Co.

QUIXSTART Chemical Co., Providence, R. I.

SPOKES

WIRE SPOKES

STANDARD Co., Torrington, Conn. (See page 591.

WIRE Goods Co., 28 Union St., Worcester, Mass.

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GENUINE ELECTRO

Nickel Chrome Steel and Nickel Steel for case hardening and oil hardening.

Lindenberg Steel Company

90 WEST STREET, NEW YORK CITY

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WAYNE
NORTHERN
QUEEN
ANHUT
HUPP 20

When ordering give car number or name plate reading, otherwise an accurate sketch or broken parts must be sent in by prepaid carriage.

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Dept. 1 Detroit, Mich.

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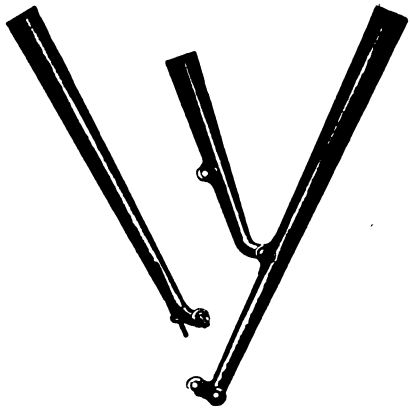
Made in Binghamton



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Our exceptional facilities enable us to handle orders for special sizes and designs promptly and satisfactorily.

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Binghamton, N. Y.

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CARBONDALE Sponge Co., Carbondale, Pa.

DAVIS & Sons, D., 45 Warren St., New York, N. Y.

FLORIDA Sponge & Chamois Co., 73 Gold St., New York, N. Y.

FUCHS Co., Max, 244 Pearl St., New York, N. Y.

GREEK American Sponge Co., Franklin & Randolph Sts., Chicago, Ill. (Importers.)

LEVY Bros., 1241 Washington St., Boston, Mass. (Importers.)

NIEHAUS Co., Jos., Cincinnati, O. (Importers.)

RHODES & Co., J. H., 162 W. Kinzie St., Chicago, Ill. (Importers.)

SMITH, Kline & French Co., 429 Arch St., Philadelphia, Pa.

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill. (Importers.)

SPRAGS

DROP SPRAGS

(See Brakes, Drop)

SPRINGS

LEAF SPRINGS

AMERICAN Spiral Spring Mfg. Co., 56th & Butler Sts., Pittsburg, Pa.

ANSTED Spring & Axle Co., Connersville, Ind.

ARMSTRONG Mfg. Co., J. B., Flint, Mich.

BUCKEYE Spring Works, 1919 Race St., Cincinnati, O.

CAMBRIA Spring Co., 913-21 Santee St., Los Angeles, Cal.

CINCINNATI & Hammond Spring Co., 909-23 Summer St., Cincinnati, O.

CLEVELAND-CANTON Spring Co., Canton, O.
(See page 569.)

COOPER Spring Co., Main Ave. & Center St., Cleveland, O.

DELANY & Son, D., Liberty & Hamilton Sts., Newark, N. J.

DETROIT Steel Products Co., Boulevard & Griffin St., Detroit, Mich.
(See page 283.)

DRAGON—See Sheldon Axle Co.

FORT Pitt Spring & Mfg. Co., McKees Rocks, Pa.

FOWLER—See National Spring Co.

GARDEN City Spring Works, 2300 Archer Ave., Chicago, Ill.

HARVEY Spring Co., Box 34, Racine, Wis.
(See page 381.)

HESS-PONTIAC Spring & Axle Co., Pontiac, Mich.
(See page 513.)

HESS Spring & Axle Co., Carthage, O.
(See page 579.)

HIGGINS Spring & Axle Co., 1314 16th St., Racine, Wis.
(See page 375.)

HUSTON Multiple C Spring Co., Parkway Bldg., Philadelphia, Pa.

IRON City Spring Co., 2916-26 Smallman St., Pittsburg, Pa.

JENKINS Mfg. Co., 118 N. Third St., St. Louis, Mo. "Vulcan."

KALAMAZOO Spring & Axle Co., Portage St., Kalamazoo, Mich.

KEYSTONE Spring Works, 1313 Buttonwood St., Philadelphia, Pa.

KRUPP—See Prosser & Son.

LEWIS Spring & Axle Co., Jackson, Mich.

LIGGETT Spring & Axle Co., 1111 Park Bldg., Pittsburg, Pa.
(See page 383.)

MARBURG Bros., 1790 Broadway, New York, N. Y. (Importers.) "Marburg-Hagen."
(See page 589.)

MARBURG-HAGEN—See Marburg Bros.

MATHER Spring Co., Toledo, O.
(See page 381.)

MERRILL Spring Co., E. R., 530 West 28th St., New York, N. Y.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y.

NATIONAL Spring Co., New Castle, Ind. "Fowler."
(See page 375.)

PALMER, Jos., 333 Rutherford Ave., Boston, Mass.

PENN Spring Works, Baldwinsville, N. Y.
(See page 460.)

PERFECTION Spring Co., Cleveland, O.
(See page 576.)

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

ROWLAND, Wm. & Harvey (Frankfort), Philadelphia, Pa.

SCRANTON Axle & Spring Co., Scranton, Pa.

SHELDON Axle Co., Wilkes-Barre, Pa. "Dragon."
(See page 59.)

SPRING Perch Co., 232 John St., Bridgeport, Conn.

TROY Spring Works, 394-96 Congress St., Troy, N. Y.

TUTHILL Spring Co., 766 Polk St., Chicago, Ill.
(See page 375).

VULCAN—See Jenkins Mfg. Co.

WATERTOWN Spring Works, Watertown, N. Y.

WESTERN Spring & Axle Co., Cincinnati, O

MACHINERY SPRINGS

AMERICAN Spiral Spring Mfg. Co., 56th & Butler Sts., Pittsburgh, Pa.

AMERICAN Steel & Wire Co., 72 W. Adams St., Chicago, Ill.
(See page 451.)

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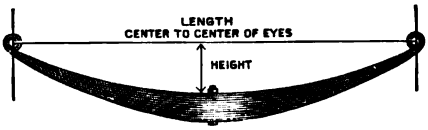
Harvey Auto Springs

All Styles and Shapes Made to Order

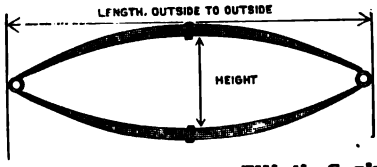
The best that good steel, experience, modern facilities and skilled workmen can make. All springs are tested before leaving the factory and a careful record kept for future reference.

We are glad to give you the benefit of our experience in designing springs for new cars.



The way to measure a Half Spring

Give size of eye bolt and note whether center bolt is in center or out of center. If out of center give length of each end of spring.



The way to measure an Elliptic Spring

Always give the width of the spring, the number of leaves and the combined thickness of the leaves.

It is also well to give make and model of car. If measurements are carefully given we can replace any spring. Prompt attention and reasonable prices.

HARVEY SPRING CO. Box 34 RACINE, WIS.

MATHER SPRING Co.

Mather Springs—all of them—are tested and no spring that takes a permanent set under a very severe test is put upon the market.

Mather Springs are *hand fitted, heat treated* and *tempered in oil*—not flashed in oil or chilled in water. This operation, while expensive, is justified in its results.

Our guarantee goes with each set of springs—it means insuring you the best spring that long experience, modern factory methods and skilled workmen can produce.

Write for quotations and more information concerning the Mather Spring. Let us also prove to you our facilities for quick delivery.

THE MATHER SPRING COMPANY

Toledo, Ohio

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SPRINGS (Continued)

MACHINERY SPRINGS (Continued)

BARNES Co., Wallace, Bristol, Conn. (See page 665.)

CARY Spring Works, 240 W. 29th St., New York, N. Y.

CHATILLON & Sons, John, 85-93 Cliff St., New York, N. Y.

CLEVELAND Wire Spring Co., Cleveland, O.

COOK Spring Co., 420 E. 106th St., New York, N. Y.

CUYAHOGA Spring Co., 429-35 Prospect Ave., N. W., Cleveland, O.

DUNBAR Bros. Co., Bristol, Conn.

EAGLE—See Miller & Van Winkle.

EUREKA Spring Co., 347 W. Broadway, New York, N. Y.

FISCHER Spring Co., Chas., 88-90 Walker St., New York, N. Y.

FORT Pitt Spring & Mfg. Co., McKees Rocks, Pa.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. (See page 221.)

GARDNER Wire Co., 5642-46 Ohio St. (Austin Station), Chicago, Ill.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill. (See page 549.)

HARROW Springs Co., 745 E. Vine St., Kalamazoo, Mich.

HEBB, George A., 70 William St., Newark, N. J.

HUBBARD Spring Co., M. D., Pontiac, Mich. (See page 385.)

MILLER Wire Spring Co., Bridgeport, Conn.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y. "Eagle."

MORGAN Spring Co., Worcester, Mass.

N. Y. Wire & Spring Co., 586-88 Washington St., New York, N. Y. (See page 385.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

RAYMOND Mfg. Co., W. Church St., Corry, Pa.

SABIN Machine Co., Montpelier, Vt.

TUCK Mfg. Co., 74 Ames St., Brockton, Mass.

WILSON, Robert P., 320 Market St., Newark, N. J.

SEAT OR UPHOLSTERY SPRINGS

BARBER Mfg. Co., Anderson, Ind. "Cardinal." (See page 385.)

BLACK VELVET—See National Spring & Wire Co.

CARDINAL—See Barber Mfg. Co.

D'ARCY Spring Co., Kalamazoo, Mich.

DEAN & Co., Henry E., 180 Austin Ave., Worcester, Mass.

DETROIT Wire Spring Co., Detroit, Mich. "Detroiter." (See page 509.)

DETROITER—See Detroit Wire Spring Co.

EXCELSIOR—See Trenton Spring & Mattress Co.

FOSTER Bros. Mfg. Co., 137 Broad St., Utica, N. Y.

GIBSON Co., Wm. D., Huron & Kingsbury Sts., Chicago, Ill. (See page 549.)

JACKSON Cushion Spring Co., Jackson, Mich. "Rough Rider." (See page 569.)

KELLEY & Co., E., 509 Main St., Worcester, Mass. "Union."

LACE WEB—See Trenton Spring & Mattress Co.

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MILLER Wire Spring Co., Bridgeport, Conn.

MILLER & Van Winkle, 18 Bridge St., Brooklyn, N. Y.

MORGAN Spring Co., Worcester, Mass.

MURRAY Spring Co., Wm. A., 132 Sycamore St., Cincinnati, O.

NATIONAL Spring & Wire Co., Albion, Mich. "Black Velvet," "Rocky Road."

ROCKY ROAD—See National Spring & Wire Co.

ROUGH RIDER—See Jackson Cushion Spring Co.

SIMMONS Mfg. Co., Kenosha, Wis.

STAPLES & Hanford Co., Newburgh, N. Y.

TRENTON Spring Mattress Co., Trenton, N. J. "Excelsior," "Lace Web."

UNION—See Kelley & Co.

VACO—See Vincent-Alward Co.

VINCENT-ALWARD Co., Kenosha, Wis., "Vaco."

WING Co., Charles, Amesbury, Mass. (See page 507.)

SUPPLEMENTARY SPRINGS

(See also Shock Absorbers; also Straps, Rebound)

ACME Torsion Spring Co., 998-1000 Boylston St., Boston, Mass.

B. & R. Shock-Absorber Co., 1429 Spring Garden St., Philadelphia, Pa.

BLACKLEDGE Mfg. Co., John W., 2110 Michigan Ave., Chicago, Ill.

COX Brass Mfg. Co., Albany, N. Y. (See page 467.)

FALKENHAINER & Co., 313 Carr St., St. Louis, Mo. "Ri-D-Z."

HASSLER, Robert H., W. Tenth & Canal Sts., Indianapolis, Ind.

J. M. Shock Absorber Co., 210 S. 17th St., Philadelphia, Pa. (See page 369.)

KEYSTONE Spring Works, 1313 Buttonwood St., Philadelphia, Pa.

POWERS Spring Co., 239-41 W. 56th St., New York, N. Y.

RI-D-Z—See Falkenhainer & Co.

ST. LOUIS Supplementary Spiral Spring Co., 4523 Delmar Ave., St. Louis, Mo.

TOP STRAP SPRINGS

BON Mfg. Co., Elgin, Ill. "Elgin."

ELGIN—See Bon Mfg. Co.

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Open Hearth Carbon—Chrome Vanadium

The only manufacturer in the country using molten lead for heat treating springs. The results justify the expense. All springs tested by specially designed machines.

AXLES

Front—I-beam and square beds for both pleasure and commercial vehicles. Roller bearings.

Rear—Chain Drive—I-beam or square beds. Complete with hubs, roller bearings, brakes, sprockets and strut rods.

Rear—Shaft Drive—Floating type, equipped with roller bearings.

Forgings—Universal Joints, Screw Machine Work, Brass Couplings, Tees, Elbows and Check Valves.

Our product is the result of exhaustive study and research by both scientific and practical men skilled in the various arts.

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SPROCKETS

MACHINED SPROCKETS

(For Sprocket Blanks—See Castings; also Forgings; also Gears, Blank)

BALDWIN Chain & Mfg. Co., Worcester, Mass.
(See page 169.)

BILLINGS & Spencer Co., Hartford, Cann.

BOSTON Gear Works, Norfolk Downs, Mass.
(See page 211.)

BULTMAN Co., F. H., 2108 Superior Viaduct, Cleveland, O.

CULLMAN Wheel Co., 1352 Greenwood Terrace, Chicago, Ill.
(See page 263.)

DIAMOND Chain & Mfg. Co., Indianapolis, Ind.
(See page 127.)

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

FORG, Peter, 50 Park St., Somerville, Mass.

GREAT Western Mfg. Co., Laporte, Ind.

MUNCIE Gear Works, Muncie, Ind.

NEW England Gear Works, 100 Purchase St., Boston, Mass.

PARISH & Bingham Co., Cleveland, O.
(See page 185.)

PENNSYLVANIA Gear Works, 437 N. Broad St., Philadelphia, Pa.

SIER-BATH Co., 143 W. 54th St., New York, N. Y.
(See page 533.)

STAMPINGS

STEEL STAMPINGS

ACKLIN Stamping Co., Toledo, O.

ADVANCE Machinery Co., 517-29 Hamilton St., Toledo, O.

AMERICAN Brass Novelty Co., Grand Haven, Mich.

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

ASHLEY Machine Works, 724 University Ave., Rochester, N. Y.
(See page 261.)

ATLAS Stamping Co., 557-61 Jackson Blvd., Chicago, Ill.

AVERY Stamping Co., 5209 Lakeside Ave Cleveland, O.

BAY State Stamping Co., 380 Chandler St. Worcester, Mass.

BETTCHER Mfg. Co., Cleveland, O.

BLAIR Tool & Machine Works, 521 Greenwich St., New York, N. Y.

BLISS Mfg. Co., E. C., 84 Chestnut St., North Attleboro, Mass.
See page 505.)

BOSSERT Co., Utica, N. Y.
(See page 233.)

BOSTON Pressed Metal Co., 171-78 Union St., Worcester, Mass.

BOWEN Mfg. Co., Mechanic St., Auburn, N. Y.
(See page 165.)

BREGWOODKRO Stamping & Mfg. Co., Lorain, O.

BRIDGEPORT Metal Goods Mfg. Co., Howard Ave. & Spruce St., Bridgeport, Conn.

BUFFALO Pressed Steel Co., Military Rd. & Lansing St., Buffalo, N. Y.

BURR Mfg. Co., 2108 Superior Ave., N. W., Cleveland, O.

CASSADY-FAIRBANK Mfg. Co., 6106-30 La Salle St., Chicago, Ill.

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

CROSBY Co., Buffalo, N. Y.

CROWE Name Plate & Engraving Co., Chicago, Ill.
(See page 307.)

CUSTER Coupling Co., Bradford, Pa.

DAVIES-BACH Mfg. Co., Davies Bldg., Alliance, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 233.)

DIAMOND Mfg. Co., Detroit, Mich.

DISSTON & Sons, Henry, (Tacony), Philadelphia, Pa.

DRIGGS - SEABURY Ordnance Corp., Sharon, Pa.
(See page 607.)

EASTERN Machine & Stamping Co., 15 Wickenden St., Providence, R. I.

ENGLAND Mfg. Co., 1559 Jefferson Ave., W., Detroit, Mich.

ERIE Stamping & Mfg. Co., 644-48 W. 12th St., Erie, Pa.

FANNER Mfg. Co., Brookside Pk., Cleveland, O.

FARIES Mfg. Co., Decatur, Ill.

FORG, Peter, 50 Park St., Somerville, Mass.

FORSYTH Bros. Co., Harvey, Ill.

FORT DEARBORN Mfg. Co., 1574-80 Crossing St., Chicago, Ill.

FRIES & Co., Buffalo, N. Y.

GARAGE Equipment Mfg. Co., Milwaukee, Wis.
(See page 221.)

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

GEM Mfg. Co., 3251 Spruce St., Pittsburg, Pa.

GEM Stamped Steel Co. (Chelsea Station), Boston, Mass.

GEUDER, Paeschke & Frey Co., 100 15th St., Milwaukee, Wis.

GIER & Dail Mfg. Co., Lansing, Mich.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O.
(See page 91.)

GREER, Fredric, 525 W. Van Buren St., Chicago, Ill.

HARDY Mfg. Co., Pendleton, Ind.
(See page 177.)

HAWTHORNE Mfg. Co., 38 Spruce St., Bridgeport, Conn.

HAYES-IONIA Co., Ionia, Mich.

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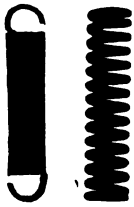

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Spring Cotters Small Washers

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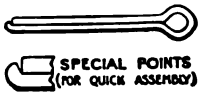

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Vanadium and High Carbon Oil Tempered Springs

HIGH GRADE SPRINGS OUR SPECIALTY

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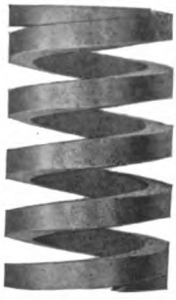
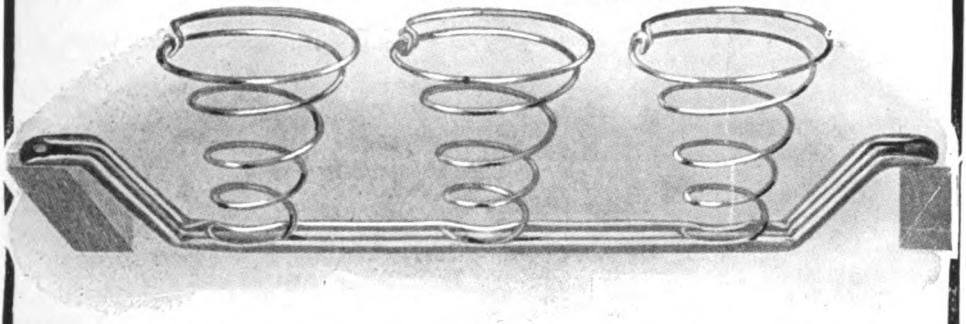


Spring Clutch

The CARDINAL



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ALL spirals in our spring work are made from the highest grade of spring wire, re-tempered, making it particularly strong and elastic. The spirals are firmly seated in a tempered steel arch with edges turned upward. They are absolutely noiseless, with greatest strength and durability. The very severest punishment the cushion may receive will not strain or injure it.

"The Cardinal" is shipped to you finished and ready for the frame—not more than thirty seconds required to spring the seat.

In your own interests, get full particulars and prices—it will pay you

BARBER MANUFACTURING COMPANY
ANDERSON, INDIANA, U. S. A.

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STAMPINGS (Continued)

STEEL STAMPINGS (Continued)

HERO Mfg. Co., Gaul & Adams Sts., Philadelphia, Pa.

HILL Co., Geo. Q., 32-34 Dorchester Ave., Boston, Mass.

HOEFT & Co., Ashland Ave. & Kinzie St., Chicago, Ill.

HOUGHTON Mfg. Co., 81-89 Exchange St., Worcester, Mass.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O.
(See page 321.)

INDIANAPOLIS Tool & Mfg. Co., Indianapolis, Ind.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

JANNEY, Steinmets & Co., Philadelphia, Pa.
(See page 411.)

KALES-HASKEL Co., 441-53 Lafayette Blvd., Detroit, Mich.

KICKHAEFER Mfg. Co., 199-201 Oregon St., Milwaukee, Wis.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

KONIGSLOW Mfg. Co., Otto., Cleveland, O.

KRUPP—See Prosser & Son.

LA PORTE Radiator Co., La Porte, Ind.

LENNOX Jack Works, 1104 Prospect Ave., S. E., Cleveland, O.

LINDHOLM Metal Stamping Co., 111 Erie St., Camden, N. J.
(See page 165.)

McDOWELL Mfg. Co., 541 Wood St., Pittsburg, Pa.
(See page 585.)

MASSACHUSETTS Machine Shop, 100 Beacon St., Worcester, Mass.

MATHEWS Mfg. Co., H. A., Seymour, Conn.

MATTHEWS Mfg. Co., Worcester, Mass.

METAL Specialty Co., Cincinnati, O.

METROPOLITAN Mfg. Co., Detroit, Mich.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Stamping Co. (E. Moline), Moline, Ill.

MOORE & Co., 301 W. Grand Ave., Chicago, Ill.

MORGAN Spring Co., Worcester, Mass.

MOSSBERG Co., Frank, Attleboro, Mass.
(See page 557.)

NATIONAL Stamping & Electric Works, 417-26 Clinton St., Chicago, Ill.

NEWARK Stamping Co., Newark, O.
(See page 423.)

OAKES Pressed Steel Co., Indianapolis, Ind.
(See page 177.)

PARISH & Bingham Co., Cleveland, O.
(See page 185.)

PARKER White Metal & Machine Co., 2217-23 Rail Road St., Erie, Pa.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

QUINSIGAMOND Pressed Steel Co., 62 Jackson St., Worcester, Mass.

R. P. K. Pressed Metal Co., 331 Madison Ave., New York, N. Y.

RAMSDELL Specialty Co., W. Boylston St., Worcester, Mass.

ROCHESTER Pressed Steel Co., 16 Commercial St., Rochester, N. Y.

ROYAL Enameling & Mfg. Co., 336 W. Madison St., Chicago, Ill.

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y.
(See page 601.)

S. & I. Co., 53-55 Governor St., Springfield, Mass.

SCHATZ Mfg. Co., 17 Fairview Ave., Poughkeepsie, N. Y.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SESSIONS & Son, J. H., Bristol, Conn.

SMITH Co., A. O., Milwaukee, Wis.
(See page 387.)

SPAFFORD Tool Works, 32 Union Pl., Hartford, Conn.

SPARKS - WITHINGTON Co., Jackson, Mich.
(See page 175.)

SPECIAL Machine Co., 184 John St., Bridgeport, Conn.

STANDARD Mfg. Co., 990 Housatonic Ave., Bridgeport, Conn.

STANDARD Steel Box Co., Bridgeville, Pa.

STANDARD Tool & Mfg. Co., 72 Champlain St., Detroit, Mich.

STANLEY Works, New Britain, Conn.

STEARNS Stamping Co., W. H., 34 Southbridge St., Worcester, Mass.

STERLING Machine & Stamping Co., Wellington, O.

SUPERIOR Lamp Mfg. Co., 2422 First Ave., New York, N. Y.

SUPERIOR Metal Products Co., Elyria, O.
(See page 403.)

SYRACUSE Metal Stamping Co., Syracuse, N. Y.

TRANSUE & Williams Co., W. Ely St., Alliance, O.

TURNER Brass Works, Sycamore, Ill.

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

VOELKNER & Harry Mfg. Co., 282-92 Woodbridge St., E., Detroit, Mich.

W. & S. Mfg. Co., 9 Hunt St. Worcester, Mass.

WALKER-WELLS Co., Amesbury, Mass.

WILCOX Co., W. W., 1713-35 Armitage Ave., Chicago, Ill.

WORCESTER Pressed Steel Co., Worcester, Mass.
(See page 169.)

STANDS

WASH STAND LIGHT STANDS

(See Lights, Wash Stand)

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Pressed Steel Frames for Pleasure Cars & Trucks

Axle Housings and Heavy Stampings

Forgings

A perfect frame is as necessary on a motor vehicle as a good foundation under a building.

SMITH FRAMES are made either of alloy steel heat treated or of SMITH HIGH CARBON STEEL.

We are the largest makers of pressed steel frames in the country—and make them for nationally known concerns. Biggest makers and largest users is a winning combination.

GET IN TOUCH WITH US.

Write.

A. O. SMITH COMPANY
MILWAUKEE

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STARTERS

ACETYLENE GAS ENGINE STARTERS

ACME—See Sheer Co.

COX Brass Mfg. Co., Albany, N. Y. "Crankless." (See page 467.)

CRANKLESS—See Cox Brass Mfg. Co.

CRARY—See T. C. F. Mfg. Co.

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

EMPIRE Starter Co., Montpelier, Ind.

HOME Light Co., 2108 Dayton St., Chicago, Ill. "U. S."

HANNA Starter Co., 701 S. Salina St., Syracuse, N. Y.

INVINCIBLES Starter Co., Penobscot Bldg., Detroit, Mich.

METEOR Auto Tank Co., 1666 Broadway, New York, N. Y.

MONTROY Ignition Starter Co., Coahoma, Miss.

POLSON Mfg. Co., 27 Chenango St., Buffalo, N. Y.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

REKAR Automatic Starter Co., David Hewes Bldg., San Francisco, Cal.

SHEER Co., H. M., Quincy, Ill. "Acme."

T.A.D.—See Toledo Auto Devices Co.

TATE—See United Motor Equipment Co.

TIMME, A. F., 315 Mineral St., Milwaukee, Wis.

TOLEDO Auto Devices Co., Gardner Bldg., Toledo, O. "T. A. D."

TROY Auto Specialty Co., Troy, N. Y.

U. S.—See Home Light Co.

UNITED Motor Equipment Co., 19 S. La Salle St., Chicago, Ill. "Tate."

VIM Mfg. Co., Clark Ave. & 61st St., Cleveland, O.

WHITEHOUSE Mfg. Co., E. A., 42-54 Elm St., Newark, N. J. (See page 271.)

COMPRESSED AIR ENGINE STARTERS

AKRON—See Motor Starting Co.

AUTO Air Appliance Co., Annapolis, Md. "Crouse."

BIRD & SMITH, 925 Santee St., Los Angeles, Cal. "Smiths."

OHICAGO-RACINE Aluminum Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill. "Vance."

CHRISTENSEN Engineering Co., 841-47 30th St., Milwaukee, Wis.

CRESCENT Co., 1199 Woodward Ave., Detroit, Mich.

CROUSE—See Auto Air Appliance Co.

GEMMER-DETROIT Starter Co., Dime Bank Bldg., Detroit, Mich.

HAM-MEIX Mfg. Co., W. 11th St. & Belt Railroad, Indianapolis, Ind. "H & M."

H & M—See Ham-Meix Mfg. Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. (See page 411.)

KELLOGG Mfg. Co., 3 Circle St., Rochester, N. Y. (See page 331.)

LIPMAN Mfg. Co., 211 Pleasant St., Beloit, Wis.

LOMBARD Mfg. Co., 30-40 S. Water St., Rochester, N. Y.

MANZEL Bros. Co., 320 Babcock St., Buffalo, N. Y. (See page 327.)

MOTOR Starting Co., 10 Buchtel Ave., Akron, O. "Akron."

NEVER MISS—See Wilson Motor Starter Co.

ROTH-MURPHY Engine Starter Co., Lemcke Bldg., Indianapolis, Ind.

SCHAEFER-FRENZEL Co., Dime Savings Bank Bldg., Detroit, Mich.

SMITHS—See Bird & Smith.

STANDARD Appliance Co., Franklin, Pa.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

STEVENS Mfg. & Supply Co., 1223-27 Wabash Ave., Chicago, Ill.

TEN EYCK Pump Co., 10 Garden St., Auburn, N. Y.

THURBER Rotary Starter Co., Detroit, Mich. (See page 389.)

TROY Auto Specialty Co., Troy, N. Y.

VANCE—See Chicago-Racine Aluminum, Brass & Iron Works.

WILSON Motor Starter Co., Franklin, Pa "Never Miss."

ELECTRIC ENGINE STARTERS

ADAMS-BAGNALL Electric Co., Cleveland, O. (See page 243.)

APELCO—See Apple Electric Co.

APPLE Electric Co., 16 Canal St., Dayton, O. "Apelco." (See page 159.)

AUTO-LITE—See Electric Auto-Lite Co.

BAILEY Electric Co., Grand Rapids, Mich.

BIJOU Motor Lighting Co., 15th St. & River Front, Hoboken, N. J.

BRIGGS Magneto Co., Elkhart, Ind.

DAYTON-DICK Co., Quincy, Ill. (See page 409.)

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DEACO—See Detroit Electric Appliance Co.,

DEAN Electric Co., 2515 Taylor St., Elyria, O. (See page 138.)

DELCO—See Dayton Engineering Laboratories Co.

DETROIT Electric Appliance Co., 264-68 Jefferson Ave., Detroit, Mich. "Deaco."

DYNETO Electric Co., Syracuse, N. Y., "Entz." (See page 391.)

ECK Dynamo & Motor Co., Belleville, N. J. (See page 409.)

Complete Index to Classification appears on Pages 8 to 22.

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The THURBER ROTARY STARTER

Power and Simplicity—the Big Points in a Self-Starter

The Thurber Rotary Starter will Easily Spin the Heaviest and Stiffest Motor Made.

In this starter are combined both exceptional power and simplicity. The Thurber is not merely a cranking device, it is a real starter that is always on the job and will turn over any motor, no matter how large.

And this device is a marvel of simplicity. It consists of a small rotary, with air pump built integral, an air tank and one valve. There are no extra attachments or parts to bother with. This simplicity makes it possible for any machinist to install the Thurber Rotary Starter.

The Thurber is always on duty. There is nothing complicated, nothing to get out of order, nothing difficult to operate. It works on the well-recognized principles of the turbine; compressed air is pumped into the tank to start the motor. This air flows into the rotary which is attached to the crank shaft of the motor. And it will spin the motor over three hundred revolutions per minute.

The absolute reliability of compressed air as motive power is unquestioned and the Thurber applies this power effectively and economically. It requires no care to speak of, no delicate adjustments—it's a **no-trouble** starter.

Dealers—There is Money to be Made.

Many cars are being made without self-starters and at times you lose a sale because the car is not so equipped. Why not install a Thurber? Your customer will gladly pay the extra cost as he knows the convenience of a starting device.

Then, too, many starters are being sold to those who are already car owners. In the Thurber you can offer your customers a starter that can be attached quickly and without any extras. It's built to fit any car.

A Money Saver for Motor Trucks.

Put a Thurber Rotary Starter on a motor truck; it will save its cost in almost no time. Think of the gasoline used while the motor is running and the truck is waiting for a delivery. With a Thurber you save all that fuel, oil and wear and tear in your truck.

Such a device speeds up deliveries, the driver loses no time in cranking the motor.

Investigate the Thurber.

With the present demand for self-starters, you should know all about the Thurber —how simple it is, how easy to install and its wonderful effectiveness. Let us send you literature more fully describing this remarkable device. We have an exceptionally good proposition for dealers.

The Thurber Rotary Starter Company
DETROIT, MICH.

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STARTERS (Continued)

ELECTRIC ENGINE STARTERS (Continued)

ELECTRIC Auto-Lite Co., 108 Michigan St., Toledo, O. "Auto-Lite." **(See page 171.)**

ELECTRIC Generator & Accumulator Co. of America, 140 S. Dearborn St., Chicago, Ill. "Elgenac."

ELGENAC—See Electric Generator & Accumulator Co. of America.

EMERSON Electric Mfg. Co., 2024-32 Washington Ave., St. Louis, Mo.

ENTZ—See Dyneto Electric Co.

ESTERLINE Co., 228 E. South St., Indianapolis, Ind.

FISHER Electrical Works, 2000 Larned St., W., Detroit, Mich. **(See page 409.)**

GRAY & Davis, Boston, Mass. **(See page 407.)**

HARTFORD Suspension Co., 172 Bay St., Jersey City, N. J. **(See page 367.)**

HOLT Electric Co., 377 S. Pierce St., Milwaukee, Wis.

INST Lighter Co., 59 E. Main St., Columbus, O.

JENNEY Electric Starter Co., 401-03 S. Illinois St., Indianapolis, Ind.

JESCO—See Jones Electric Starter Co.

JONES Electric Starter Co., 1401 W. Jackson Blvd., Chicago, Ill. "Jesco." **(See page 393.)**

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

LEONARD Electric Co., Ward, Bronxville, N. Y.

M. R. T. Electric Light & Starter Co., Des Moines, Ia.

NORTH East Electric Co., Rochester, N. Y. **(See page 601.)**

OTHO Motor Co., 60 State St., Boston, Mass.

PARIS Electric Starter Co., Paris, Ill.

REMY Electric Co., Anderson, Ind. **(See page 497.)**

RUSHMORE Dynamo Works, Plainfield, N. J. **(See page 245.)**

U-S-L—See U. S. Light & Heating Co.

U. S. Light & Heating Co., 30 Church St., New York, N. Y. "U-S-L." **(See page 173.)**

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WARNER Mfg. Co., Toledo, O. **(See page 481.)**

WELLS Mfg. Co., R. C., Station A, Fond du Lac, Wis. **(See page 409.)**

WESTINGHOUSE Electric & Mfg. Co. (East Pittsburg), Pittsburg, Pa.

GASOLINE OR VAPOR ENGINE STARTERS

(For Priming Devices—See Primers; Gasoline Engines

AURORA Vulcan Co., Security Bldg., Bridgeport, Conn.

AUTOMATIC Starter Co., 418 N. Third St., St. Louis, Mo.

BROWN-MADDOCK Co., West Newbury, Mass.

MARKHAM Co., W. D., Clarksdale, Miss.

MANUAL OR PEDAL OR LEVER ENGINE STARTERS

(See also Cranks, Safety Starting)

AUTOMATIC Appliance Co., 162-72 Columbus Ave., Boston, Mass. "Boston."

BOSTON—See Automatic Appliance Co.

BREMER-WILSON Mfg. Co., 1421 Michigan Ave., Chicago, Ill. "Triplex."

CONSOLIDATED Gas & Electric Co., 552 W. Lake St., Chicago, Ill.

GLENARD—See National Motor Device Co.

KNAPP Bros. Starter & Equipment Co., 24th & Central Aves., Minneapolis, Minn.

NATIONAL Motor Device Co., 3901 Ellis Ave., Chicago, Ill. "Glenard."

PERFECTION Auto Starter Co., 1551 Broadway, Denver, Colo.

SANDO Starter Co., Bennett, Ia.

TRIPLEX—See Bremer-Wilson Mfg. Co.

MECHANICAL OR SPRING ENGINE STARTERS

AMERICAN Ever Ready Co. 316 Hudson St., New York, N. Y. "Ever Ready."

AUTOMATIC Devices Co., Galesburg, Ill. "Knutson."

ELDER Mfg. Co., 2305 N. Illinois St., Indianapolis, Ind.

EVER READY—See American Ever Ready Co.

GARDNER Engine Starter Co., 1451-55 Michigan Ave., Chicago, Ill.

KNUTSON—See Automatic Devices Co.

MESNARD—See Modern Auto Starter Co.

MODERN Auto Starter Co., 2127-29 Indiana Ave., Chicago, Ill. "Mesnard."

TUDOR, J. W., 35 Congress St., Boston, Mass

UNIVERSAL Mfg. Co., Racine, Wis. **(See page 665.)**

VOLKMAR Mfg. Co., 296 E. 157th St., New York, N. Y.

STEEL

DEALERS IN STEEL

(This is a List of Dealers in Iron, Steel and other metals who advertise in this publication)

FRASSE & Co., Peter A., New York, N. Y. **(See page 589.)**

HARVEY Co., Arthur C., 374 Congress St., Boston, Mass. **(See page 413.)**

MORRIS & Co., E. K., 311-17 W. Second St., Cincinnati, O. **(See page 437.)**

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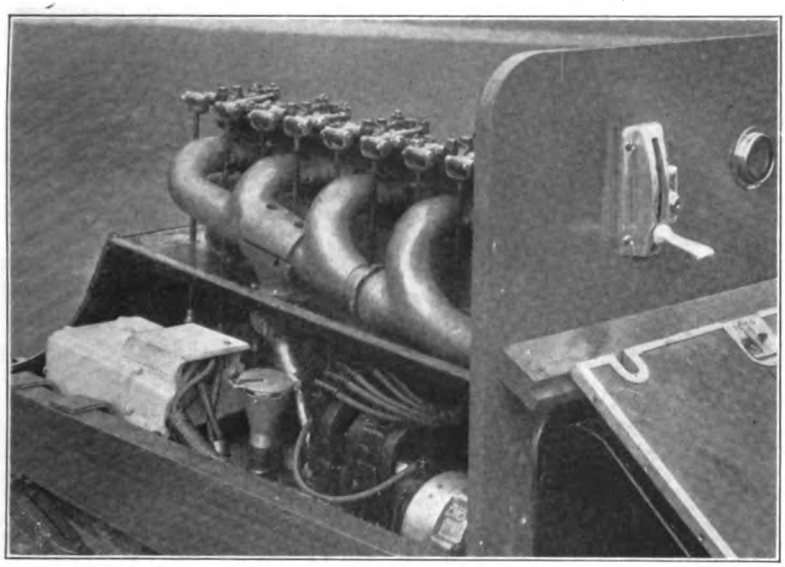
=DYNETO-ENTZ=

ELECTRIC STARTER

AND LIGHTING SYSTEM



SIMPLE
STURDY
ACCESSIBLE
SINGLE-UNIT
SYSTEM

Switch shown above is only control used

One switch; simply throw it on; that's all

The Dyneto-Entz is the most simplified system for lighting and starting. It consists of a single unit that acts as generator and motor.

The change from generator to motor is done without the aid of automatic devices or any attention on the part of the driver. It is the natural function of the type of mechanism used. The direction of the current is controlled by the speed of the armature through its magnetic fields.

Prevents Stalling

When the speed of the engine reduces to a point where it is liable to stall, its revolutions are assisted by the motor and as soon as engine picks up again the assistance from motor ceases, changing the motor to a generator. Battery is so constructed that it cannot be injured by overcharging, doing away with complicated automatic cutouts.

Only one switch—simply throw it on, it is not touched again until you want to stop engine. Adopted by the White Co., and the Franklin Mfg. Co. Illustration on this page shows Entz generator on Franklin Six.

Write for full particulars.

Can be easily installed on cars in use.

THE DYNETO ELECTRIC CO.

SYRACUSE, N. Y.

SALES AGENT:—T. J. Wetzel, 17 W. 42d Street, New York City

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STEEL (Continued)

ANGLE, CHANNEL AND TEE IRON OR STEEL

CAMBRIA Steel Co., Johnstown, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

ILLINOIS Steel Co., Commercial National Bank Bldg., Chicago, Ill.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

JONES & Laughlin Steel Co., Pittsburg, Pa.

LOCKHART Iron & Steel Co., McKees Rocks, Pa. "Vulcan."

LOGAN Iron & Steel Co., 1421 Chestnut St., Philadelphia, Pa.

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa. (See page 397.)

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

VULCAN—See Lockhart Iron & Steel Co.

BAR IRON OR STEEL

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

BALDWIN Steel Co., Charleston, W. Va.

CAMBRIA Steel Co., Johnstown, Pa.

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

ILLINOIS Steel Co., Commercial National Bank Bldg., Chicago, Ill.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

JONES & Laughlins Steel Co., Pittsburg, Pa.

KRUPP—See Prosser & Son.

LACKAWANNA Steel Co., Buffalo, N. Y.

LOCKHART Iron & Steel Co., McKees Rocks, Pa. "Vulcan."

LOGAN Iron & Steel Co., 1421 Chestnut St., Philadelphia, Pa.

PARDEE Works, C., Perth Amboy, N. J.

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa. (See page 397.)

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

RAILWAY Steel-Spring Co., 30 Church St., New York, N. Y.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

VULCAN—See Lockhart Iron & Steel Co.

SHEET STEEL

ALLEGHENY Steel Co., Brackenridge, Pa.

AMERICAN Rolling Mill Co., Middletown, O. "Middletown." (See page 401.)

AMERICAN Sheet & Tin Plate Co., Frick Bldg., Pittsburg, Pa.

CARNAHAN Tin Plate & Sheet Co., Canton, O.

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

FOLLANSBEE Bros. Co., Third & Liberty Aves., Pittsburg, Pa.

INLAND Steel Co., First National Bank Bldg., Chicago, Ill.

KRUPP—See Prosser & Son.

LA BELLE Iron Works, Steubenville, O.

McVOY Sheet & Tin Plate Co., 344-50 W. Michigan St., Chicago, Ill.

MASSILLON Rolling Mill Co., Massillon, O.

MIDDLETOWN—See American Rolling Mills Co.

PARKERSBURG Iron & Steel Co., Parkersburg, W. Va.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.

TAYLOR Co., N. & G., 308 Chestnut St., Philadelphia, Pa.

YOUNGSTOWN Sheet & Tube Co., Youngstown, O.

COLD ROLLED BAR STEEL

CAMBRIA Steel Co., Johnstown, Pa.

COLUMBIA Steel & Shafting Co., Pittsburg, Pa.

COMPRESSED Steel Shafting Co., 393 Dorchester Ave., Boston, Mass.

CRUCIBLE Steel Co., of America, Oliver Bldg., Pittsburg, Pa.

CUMBERLAND Steel Co., Williams St. & B. & O. R. R., Cumberland, Md.

FITZSIMONS Co., Youngstown, O.

JONES & Laughlins Steel Co., Pittsburg, Pa.

KRUPP—See Prosser & Son.

NEW Process Steel Corp., Lancaster, Pa.

PARDEE Works, C., Perth Amboy, N. J.

PITTSBURG Shafting Co., of Detroit, Detroit, Mich.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.

UNION Drawn Steel Co., Beaver Falls, Pa. (See page 413.)

COLD ROLLED STRIP STEEL

AMERICAN Steel & Wire Co., 72 W. Adams St., Chicago, Ill. (See page 451.)

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

CARPENTER Steel Co., Reading, Pa.

COLUMBIA Steel Co., Elyria, O.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

KRUPP—See Prosser & Son.

MORRIS & Bailey Steel Co., Pittsburg, Pa.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

STANLEY Works, New Britain, Conn.

SUPERIOR Steel Co., Carnegie, Pa.

WEST Leechburg Steel Co., Farmers Bank Bldg., Pittsburg, Pa.

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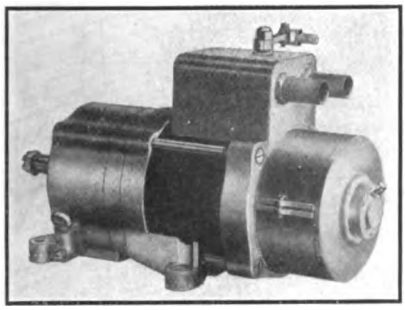
Jesco TRADE MARK

LIGHTER STARTER



New Jesco 6-volt single unit Lighter-Starter

A Proven Success For Installation On Cars Now In Use

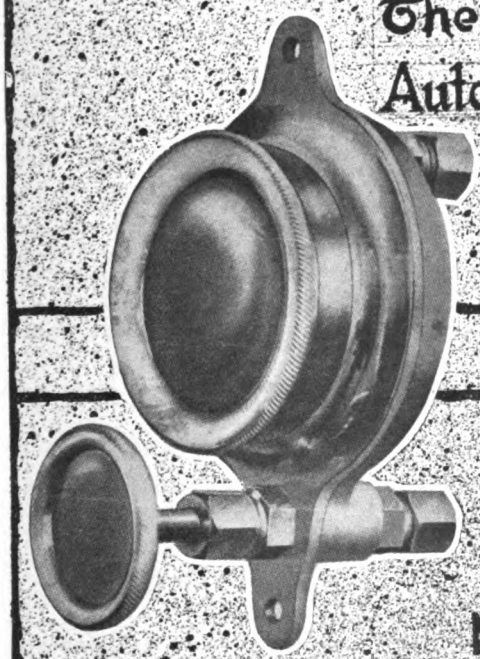
Hundreds of JESCO Starters have been installed by private owners, dealers and garagemen on various makes of cars in use. The JESCO is light, small, compact, and can be easily installed. The reliableness of the JESCO is proven by thousands in daily use.

Let us give you full particulars.

JONES ELECTRIC STARTER CO., 1401 W. Jackson Blvd. CHICAGO, ILL.

Eastern representatives: Jesco Equipment Co., 245 W. 55th St., New York, N. Y.
Chicago representatives: Chicago Electric Specialties Co., 1508 Michigan Ave., Chicago, Ill.
Foreign representatives: Eclaireur Demarreur Jesco, 735 7th Ave., New York, N. Y.

The WEBB-JAY. Automatic Suction Primer.



An Indispensable Accessory to Any Motor Car. Insures starting with the first turn of the crank, regardless of weather conditions.

Sent complete with piping and fittings for the retail price, $6.00. Special discounts to manufacturers, jobbers and dealers.

Easily attached. Automatic in its operation. The suction feature is covered by basic patents and infringers will be vigorously prosecuted.

Motor Devices Co
Chicago Ill.

52N

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STEEL (Continued)

TOOL STEEL

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

ANDREW & Co., J. H., 107 West St., New York, N. Y. (Importers.) "Toledo."

ATLAS Crucible Steel Co., 66 Howard Ave., Dunkirk, N. Y.

BALDWIN Steel Co., Charleston, W. Va.

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

BISCHOFF—See Elliott, H. A.

BRAEBURN Steel Co., Braeburn, Pa.

BROWN & Co., 10th St. & Duquesne Way, Pittsburg, Pa.

CARBON Steel Co., ft. 32d St., Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa. "Comet."

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa. "Red Star."

COLUMBIA Tool Steel Co., Chicago Heights, Ill.

COMET—See Carpenter Steel Co.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.) (See page 403.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

CYCLOPS Steel Works, Titusville, Pa.

DANNEMORA—See Nash Co.

DANNEMORA—See Ward & Sons.

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "Bischoff."

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FIRTH-STERLING Steel Co., McKeesport, Pa.

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi." (See page 589.)

HALCOMB Steel Co., Geddes St., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

HOBSON, Houghton & Co., 83 Beekman St., New York, N. Y. (Importers)

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

JESSOP & Sons, Wm., 91 John St., New York, N. Y. (Importers.) (See page 401.)

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.) (See page 379.)

LUDLUM Steel Co., Watervliet, N. Y. "Pompton."

McINNES Steel Co., Corry, Pa.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

MUIR-DAVIDSON Steel Co., 44 Cliff St., New York, N. Y. (Importers.) (See page 403.)

NASH Co., Geo., 217 Pearl St., New York, N. Y. (Importers.) "Dannemora," "Solar."

NEW Process Steel Corp., Lancaster, Pa.

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

PITTSBURGH Tool Steel Wire Co., Monaca, Pa.

POLDI—See Frasse & Co.

POMPTON—See Ludlum Steel Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

RED STAR—See Colonial Steel Co.

ROECHLING Electro Steel Co., 173-77 Lafayette St., New York, N. Y. (Importers.)

SOLAR—See Nash Co.

TOLEDO—See Andrew & Co.

VANADIUM-ALLOYS Steel Co., Latrobe, Pa. "Vasco."

VASCO—See Vanadium-Alloys Steel Co.

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

WARD & Sons, Edgar T., 23-25 Purchase St., Boston, Mass. (Importers.) "Dannemora."

SPRING STEEL

ARROW—See Crowley Co.

BALDWIN Steel Co., Charleston, W. Va.

BRAEBURN Steel Co., Braeburn, Pa.

CAMBRIA Steel Co., Johnstown, Pa.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.) "Arrow." (See page 403.)

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

HALCOMB Steel Co., Geddes St., Syracuse, N. Y.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

HELMUTH Co., L., 17 Battery Pl., New York, N. Y. (Importers.)

ILLINOIS Steel Co., Commercial National Bank Bldg., Chicago, Ill.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

MUIR-DAVIDSON Steel Co., 44 Cliff St., New York, N. Y. (Importers.) (See page 403.)

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa. (See page 397.)

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

MANGANESE STEEL

KRUPP—See Prosser & Son.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

UNITED Steel Co., Canton, O. (See page 399.)

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USE KRUPP STEEL IN YOUR CARS

And Feel Satisfied and Secure

Crank Shafts, Axles, Steering Knuckles, Gears, Frame Members, Shafts and all Forgings for Motor Cars

Carbon Steels
Nickel Steels
Chrome Nickel Steels
Vanadium Steels
Chrome Vanadium Steels
Silicon Manganese Steels
Krupp Steels

Now in Stock at New York:

Round Bars of Krupp Special **Chrome Nickel Steel,** Grade E. F. 60.0 ½" to 8" diameter for Gears, Axle Shafts, etc., having minimum elastic limit, 100,000 lbs. per square inch.

This steel can be oil or case hardened so as to have an elastic limit of over 200,000 lbs. Use this "TOUGHEST STUFF" and eliminate the breakages you are now having.

LOOK TO THE STEEL WORKS

FOR STEEL

THOMAS PROSSER & SON
Represented by
AMERICAN OFFICE.
15 GOLD ST. NEW YORK

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STEEL (Continued)

NICKEL STEEL

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

BALDWIN Steel Co., Charleston, W. Va.

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

BOKER & Co., Herman, 101 Duane St., New York, N. Y. (Importers.)

CARBON Steel Co., ft. 32d St., Pittsburg, Pa. "Nico."

CARPENTER Steel Co., Reading, Pa.

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.)
(See page 403.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi."
(See page 589.)

HALCOMB Steel Co., Geddes St., Syracuse, N. Y.

HELMUTH, Co., L., 17 Battery Pl., New York, N. Y. (Importers.)

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.)
(See page 379.)

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

MUIR-DAVIDSON Steel Co., 44 Cliff St., New York, N. Y. (Importers.)
(See page 403.)

NICO—See Carbon Steel Co.

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

POLDI—See Frasse & Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

UNION Drawn Steel Co., Beaver Falls, Pa.
(See page 413.)

UNITED Steel Co., Canton, O.
(See page 399.)

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

CHROME NICKEL STEEL

AMERICAN Import & Export Co., 150 Nassau St., New York, N. Y. (Importers.)

ARBO—See Carbon Steel Co.

ARROW—See Crowley & Co.

BALDWIN Steel Co., Charleston, W. Va.
(See page 399.)

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

BISCHOFF—See Elliott, H. A.

CARBON Steel Co., ft. 32d St., Pittsburg, Pa. "Arbo."

CARPENTER Steel Co., Reading, Pa.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.) "Arrow."
(See page 403.)

CRUCIBLE Steel Co. of Amer., Oliver Bldg., Pittsburg, Pa.

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "Bischoff."

FARIST Steel Co., 137 E. Main St., Bridgeport, Conn.

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi."
(See page 589.)

HALCOMB Steel Co., Geddes St., Syracuse, N. Y.

HELLER Bros. Co., Newark, N. J.

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

ILLINOIS Steel Co., Commercial National Bank Bldg., Chicago, Ill.

JESSOP & Sons, Wm., 91 John St., New York, N. Y. (Importers.)
(See page 401.)

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

LINDENBERG Steel Co., 90 West St., New York. N. Y. (Importers.)
(See page 379.)

McINNES Steel Co., Corey, Pa.

MAYARI—See Pennsylvania Steel Co.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

MUIR-DAVIDSON Steel Co., 44 Cliff St., New York, N. Y. (Importers.)
(See page 403.)

PENNSYLVANIA Steel Co., Morris Bldg., Philadelphia, Pa. "Mayari."
(See page 397.)

PHILADELPHIA Steel & Forge Co., 50 Church St., New York, N. Y.

POLDI—See Frasse & Co.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

ROECHLING Electro Steel Co., 173-77 Lafayette St., New York, N. Y. (Importers.)

UNION Drawn Steel Co., Beaver Falls, Pa.
(See page 413.)

UNITED Steel Co., Canton, O.
(See page 399.)

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

VANADIUM STEEL

ALLEN & Co., Edgar, 718 W. Lake St., Chi- Ill. (Importers.)

BALDWIN Steel Co., Charleston, W. Va.

CARNEGIE Steel Co., Carnegie Bldg., Pittsburg, Pa.

CARPENTER Steel Co., Reading, Pa.

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

HALCOMB Steel Co., Geddes St., Syracuse, N. Y.

HARROW Spring Co., 745 E. Vine St., Kalamazoo, Mich.

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

KRUPP—See Prosser & Son.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp."
(See page 395.)

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MAYARI STEEL

(MÝ-AR-EÉ)

NATURAL ALLOY. NICKEL-CHROME.

Manufactured From Cuban Ore

Crank-Shafts; Transmission, Drive and Jack Shafts; I-Beam, Tubular and Driving Axles; Connecting Rods; Transmission and Differential Gears, Case Hardened, Water or Oil Hardened; Frames; High Tension Bolts; Steering Knuckles; Springs; Miscellaneous Forgings to be Heat-Treated

In the untreated condition this steel may be forged, rolled or machined the same as carbon steel; experience in special steels is not essential. After heat-treatment will show from 50,000 to over 200,000 pounds per square inch Elastic Limit, according to grade and treatment. An excellent base for VANADIUM additions, superior to chrome-vanadium steel.
Supplied in round or square bars, flats; billets; forging blooms, concave spring flats. Rolled, smooth forged, cold drawn or turned bars.

Silico-Manganese Spring Steel

Concave Flats and Standard Rounds.

Tensile Strength 210,000, Elastic Limit 190,000, Elongation in 2" 10.0%, Reduction of Area 30.0%, Tough, Resilient, Fibrous.

Write for Descriptive Booklet

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Morris Building, Philadelphia

Works
Steelton, Pa.

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STEEL (Continued)

VANADIUM STEEL (Continued)

UNION Drawn Steel Co., Beaver Falls, Pa. (See page 413.)

UNITED Steel Co., Canton, O. (See page 399.)

VANADIUM-ALLOYS Steel Co., Latrobe, Pa. "Vasco."

VASCO—See Vanadium-Alloys Steel Co.

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

ALUMINUM COATED SHEET STEEL

ALUMALOYD Products Co., Canton, O.

HIGH-SPEED CUTTING STEEL

ALBION—See Hobson, Houghton & Co.

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

ANDREW & Co., J. H., 107 West St., New York, N. Y. (Importers.) "Toledo."

ARK—See Jessop & Sons.

ATLAS Crucible Steel Co., 66 Howard Ave., Dunkirk, N. Y. "Loco."

BALDWIN Steel Co., Charleston, W. Va. "Hudson."

BOHLERS—See Houghton & Richards.

BOKER & Co., Hermann, 101 Duane St., New York, N. Y. (Importers.) "Novo."

BRAEBURN Steel Co., Braeburn, Pa.

BURGESS—See Cyclops Steel Works.

CAPITAL—See Nash Co.

CARDINAL—See Elliott, H. A.

CARPENTER Steel Co., Reading, Pa. "Zenith."

COLONIAL Steel Co., Keystone Bldg., Pittsburg, Pa.

COLUMBIA Tool Steel Co., Chicago Heights, Ill.

CROWLEY Co., John A., 120-22 Liberty St., New York, N. Y. (Importers.) (See page 403.)

CRUCIBLE Steel Co. of America, Oliver Bldg., Pittsburg, Pa.

CYCLOPS Steel Works, Titusville, Pa. "Burgess."

DREADNOUGHT—See Halcomb Steel Co.

ELLIOTT, H. A., Majestic Bldg., Detroit, Mich. (Importer.) "Cardinal."

FRASSE & Co., Peter A., New York, N. Y. (Importers.) "Poldi." (See page 589.)

HALCOMB Steel Co., Geddes St., Syracuse N. Y. "Dreadnought."

HELLER Bros. Co., Newark, N. J.

HOBSON, Houghton & Co., 83 Beekman St., New York, N. Y. (Importers.) "Albion."

HOUGHTON & Richards, 145 Oliver St., Boston, Mass. "Bohlers."

HUDSON—See Baldwin Steel Co.

IMPROVED CAPITAL—See Ward & Sons.

JESSOP & Sons, Wm., 91 John St., New York, N. Y. (Importers.) "Ark." (See page 401.)

JONES & Co., B. M., 141 Milk St., Boston, Mass. (Importers.) "Mushet."

KREFELD Steel Co., 50 Church St., New York, N. Y. (Importers.)

LINDENBERG Steel Co., 90 West St., New York, N. Y. (Importers.) (See page 379.)

LOCO—See Atlas Crucible Steel Co.

McINNES Steel Co., Corry, Pa.

MIDVALE Steel Co. (Nicetown), Philadelphia, Pa.

MUIR-DAVIDSON Steel Co., 44 Cliff St., New York, N. Y. (Importers.) (See page 403.)

MUSHET—See Jones & Co.

NASH Co., Geo., 217 Pearl St., New York, N. Y. (Importers.) "Capital."

NOVO—See Boker & Co.

POLDI—See Frasse & Co.

RED CUT SUPERIOR—See Vanadium-Alloys Steel Co.

ROECHLING Electro Steel Co., 173-77 Lafayette St., New York, N. Y. (Importers.)

TOLEDO—See Andrew & Co.

VANADIUM-ALLOYS Steel Co., Latrobe, Pa. "Red Cut Superior."

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

WARD & Sons, Edgar T., 23-25 Purchase St., Boston, Mass. (Importers.) "Improved Capital."

ZENITH—See Carpenter Steel Co.

SELF-HARDENING CUTTING STEEL

AJAX—See Baldwin Steel Co.

ALLEN & Co., Edgar, 718 W. Lake St., Chicago, Ill. (Importers.)

BALDWIN Steel Co., Charleston, W. Va. "Ajax."

BLUE CHIP—See Firth-Sterling Steel Co.

FIRTH-STERLING Steel Co., McKeesport, Pa. "Blue Chip."

HALCOMB Steel Co., Geddes St., Syracuse, N. Y.

HOBSON, Houghton & Co., 83 Beekman St., New York, N. Y. (Importers.) "Soho."

ILLINGSWORTH Steel Co., John (Frankford), Philadelphia, Pa.

JESSOP & Sons, Wm., 91 John St., New York, N. Y. (Importers.) (See page 401.)

JONES & Co., B. M., 141 Milk St., Boston, Mass. (Importers.) "Mushet."

MUSHET—See Jones & Co.

SOHO—See Hobson, Houghton & Co.

VULCAN Crucible Steel Co., First St., Aliquippa, Pa.

STEPS

FORGED STEPS

(See Forgings, Drop)

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Our Alloy Chrome Vanadium, Chrome Nickel, Nickel and Special O. H. Steels are made and handled with but one object in view—to produce the best for the use to which it will be subjected. Our new process of cross-rolling assures uniform quality.

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Canton, Ohio

New York Chicago Detroit

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STEPS (Continued)

SPECIAL STEPS AND RUNNING BOARDS

BOSSERT Co., Utica, N. Y.
(See page 233.)

DETROIT Pressed Steel Co., 1800 Mt. Elliott Ave., Detroit, Mich.
(See page 233.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

ERDLE Perforating Co., 7 Factory St., Rochester, N. Y.

FORSYTH Bros. Co., Harvey, Ill.

HAYES Mfg. Co., Detroit, Mich. "Hayes-Stanwood."
(See pages 78 and 79.)

HAYES-STANWOOD—See Hayes Mfg. Co.

HYDRAULIC Pressed Steel Co., 3152 E. 61st St., Cleveland, O.
(See page 321.)

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MOTOR Parts Co., Plainfield, N. J. "Stanwood."

PARISH & Bingham Co., Cleveland, O.
(See page 185.)

STANWOOD—See Motor Parts Co.

STONES

OIL STONES

(For cleaning platinum points on Spark Coils)

PIKE Mfg. Co., Pike, N. H.

STRAINERS

GASOLINE STRAINERS OR SEPARATORS

(For use between tank and carbureter to remove dirt and water. For Strainer Funnels—See Funnels, Gasoline)

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich.
(See page 341.)

BINGHAM Mfg. Co., 227 Prospect Ave., N. W., Cleveland, O. "Shurecleen."

BOUSMAN Mfg. Co., 1126 Plainfield Ave., Grand Rapids, Mich. "Grand Rapids."

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

CRUM-WILEY Mfg. Co., Peru, Ind.

DAVIDSON—See Wallace Supply Co.

ELLIS—See National Sales Co.

EMMONS Specialty Co., 241 E. Jefferson Ave., Detroit, Mich. "Esco."

ESCO—See Emmons Specialty Co.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. "Rayfield."

GALLAGHER—See Lehigh Valley Foundry & Mfg. Co.

GLEASON-PETERS Air Pump Co., 255-61 Classon Ave., Brooklyn, N. Y.

GRAND RAPIDS—See Bousman Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich.

HALLADAY Co., L. P., Streator, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

HANS Motor Equipment Co., La Crosse, Wis.

HARWOOD, C. F., 516 Atlantic Ave., Boston, Mass.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

LEHIGH Valley Foundry & Mfg. Co., Easton, Pa. "Gallagher."
(See page 105.)

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 383.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

MICHIGAN Lubricator Co., 661-73 Beaubien St., Detroit, Mich.

MOSLER & Co., A. R., Mt. Vernon, N. Y.
(See page 309.)

MOTOR Shop, Barnegat, N. J.

NATIONAL Sales Co., 1000 Boylston St., Boston, Mass. "Ellis."

OATHOUT, Chas. M., Saugerties, N. Y.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

R-M—See Randall-Miller Co.

RANDALL-MILLER Co., 998-1000 Boylston St., Boston, Mass. "R-M."

RAYFIELD—See Findeisen & Kropf Mfg. Co.

REYNOLDS, George T., 341-49 Eddy St., Providence, R. I.

SHURECLEEN—See Bingham Mfg. Co.

STERLING Machine Co., Norwich, Conn. "Uncas."

STOTT-CROWLEY Mfg. Co., 1042 Grand River Ave., Detroit, Mich.

STROMBERG Motor Devices Co., Chicago, Ill.

UNCAS—See Sterling Machine Co.

WALLACE Supply Co., 108-28 N. Jefferson St., Chicago, Ill. "Davidson."

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill.
(See page 97.)

WHEELER & Schebler, Indianapolis, Ind.
(See page 597.)

ZERK Mfg. Co., Cleveland, O.

STRAPS

ANTI-RATTLING HOOD STRAPS

CAMPBELL—See Perkins Campbell Co.

HOOVER Co., W. H., New Berlin, O.

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell."
(See page 405.)

LEATHER STRAPS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.

ARMSTRONG & Graham, 128-32 Jefferson Ave., Detroit, Mich.

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in building Auto Bodies, Hoods and Fenders.
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For DIES and High-Grade TOOLS

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CLEVELAND, CHICAGO, SAN FRANCISCO

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STRAPS (Continued)

LEATHER STRAPS (Continued)

BACKSTAY Machine & Leather Co., Union City, Ind.

BAUER-LEWIS Co., 383 Holden Ave., Detroit, Mich.

BRACE Leather Goods Co., 22 Wayne St., Pontiac, Mich.
(See page 427.)

BUNGE, Otto, 1052 Dawson St., Indianapolis, Ind.

CAMPBELL—See Perkins Campbell Co.

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind.

DECKER, J. C., Montgomery, Pa.

DESOCO—See Detroit Socket Co.

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich.
(See page 83.)

DETROIT Socket Co., 814 Jefferson Ave., W., Detroit, Mich. "Desoco."

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

ECONOMY Stay Co., Jefferson City, Mo.

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

G & K—See Graton & Knight Mfg. Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K."
(See page 75.)

HAGER & Son, Chas., 244-46 E. 52d St., New York, N. Y.

HOLLIDAY & Wyon Co., West & Ohio Sts., Indianapolis, Ind.

HOOVER Co., W. H., New Berlin, O.

JEWELL Belting Co., 15 Trumbull St., Hartford, Conn.

KELLEY, A. F., 178 S. Main St., Providence, R. I.

KOPF-ENGEL Co., 49 Warren St., New York, N. Y.

KRONAUER & Co., Chas., 152 N. Desplaines St., Chicago, Ill.

LEATHER Products Co., 2268 Spring Grove Ave., Cincinnati, O.

NATIONAL Leather Mfg. Co., Niles, Mich.
(See page 77.)

PERKINS Campbell Co., 624 Broadway, Cincinnati, O. "Campbell."
(See page 405.)

RANNO-SPEIRS Co., Manchester, N. H.

REINHOLD Belting & Supply Co., 174 W. 56th St., New York, N. Y.

RHOADS & Sons, J. E., 12 N. Third St., Philadelphia, Pa.

SMITH & Son, James, 40-42 Franklin Ave., Brooklyn, N. Y.

SPECIALTY Harness Co., Dayton, Va.

SPRINGFIELD Harness Co., 55-61 Dwight St., Springfield, Mass.

STEVENS & Bro., A. A., 1234 Wabash Ave., Chicago, Ill.

STRECKER Bros. Co., 117-19 Putnam St., Marietta, O.

SUPERIOR—See Feeser Co.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.
(See page 449.)

WARREN Leather Goods Co., 80 Austin St., Worcester, Mass.

WING Co., Charles, Amesbury, Mass.
(See page 507.)

REBOUND STRAPS

(See also Shock Absorbers; also Springs, Supplementary)

BAUER-LEWIS Co., 383 Holden Ave., Detroit, Mich.

BRACE Leather Goods Co., 22 Wayne St., Pontiac, Mich.
(See page 427.)

BUCKEYE—See Central Brass & Fixture Co.

CARTER Co., George R., 1600-20 Kentucky Ave., Connersville, Ind.

CENTRAL Brass & Fixture Co., N. Fountain Ave., Springfield, O. "Buckeye." "E-Zer."

COX Brass Mfg. Co., Albany, N. Y. "E-Zer."
(See page 467.)

DETROIT Leather Works, 141-43 E. Lafayette Blvd., Detroit, Mich.
(See page 83.)

E-ZER—See Cox Brass Co.

FEESER Co., Frank S., 1102 Prospect St., Indianapolis, Ind. "Superior."

G & K—See Graton & Knight Mfg. Co.

GILMER Co., L. H., 52 N. Seventh St., Philadelphia, Pa.
(See page 73.)

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K."
(See page 75.)

HOOVER Co., W. H., New Berlin, O.

McGREGOR—See U. S. Auto Bumper Co.

MAYO Mfg. Co., 54-60 E. 18th St., Chicago, Ill. "Skinner."

MESINGER Mfg. Co., H. & F., Austin Pl. & E. 144th St., New York, N. Y.

MITCHELL—See Motor Specialties Co.

MOTOR Specialties Co., Waltham, Mass. "Mitchell."

PACIFIC Leather Works, 239 12th St., Oakland, Cal. "Sierra."

PERKINS Campbell Co., 624 Broadway, Cincinnati, O.
(See page 405.)

SIERRA—See Pacific Leather Works.

SKINNER—See Mayo Mfg. Co.

SUPERIOR—See Feeser Co.

U. S. Auto Bumper Co., 20 E. 20th St., Chicago, Ill. "McGregor."
(See page 97.)

STARTING CRANK STRAPS

(See Holders, Starting Crank)

WEB STRAPS

BUFFALO Weaving & Belting Co., 234 Chandler St., Buffalo, N. Y.

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SHEET METAL STAMPINGS AND DRAWINGS

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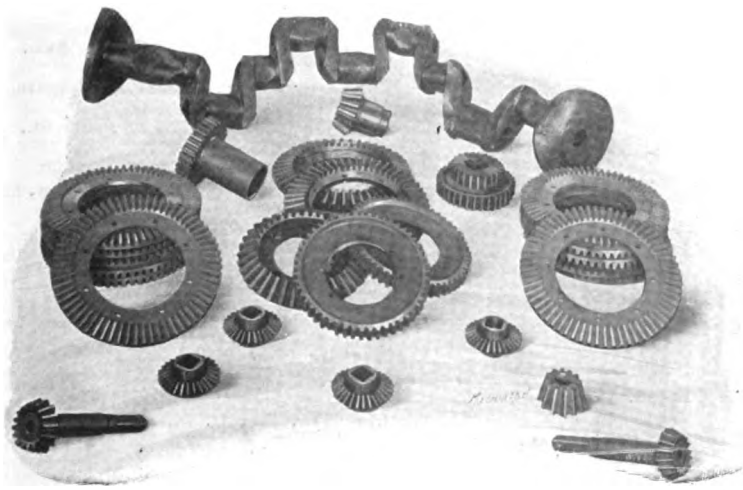

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Will stand **Highest Strains**
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Guaranteed to be **easiest machining** on the market. **Physical Qualities Very Highest.** Practically **No Distortion** at heat treatment.

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STRIPS

SPRING LEAF LUBRICATING STRIPS

DANN Oil-Cushion Spring Insert Co., 2246 Indiana Ave., Chicago, Ill.
(See page 375.)

SUPPLIES

DEALERS IN SUPPLIES

(This is a list of Dealers and Jobbers in Automobile Supplies who advertise in this publication)

POST & Lester Co., Hartford, Conn.
(See page 297.)

PRUDEN Hardware Co., W. E., 864-66 Eighth Ave., New York, N. Y.
(See page 607.)

U. S. Auto Supply Co., 182 Grand River Ave., Detroit, Mich.
(See page 405.)

WASHINGTON Automobile Supply Co., Washington, Ill.
(See page 671.)

ZINKE Co., 1256 Michigan Ave., Chicago, Ill.
(See page 373.)

SUPPORTS

HOOD SUPPORTS OR ARCH BARS

CROSBY Co., Buffalo, N. Y.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

METAL Specialty Co., Cincinnati, O.

SWITCHES

AUTOMATIC TIME SWITCHES

(For automatically turning the current on or off when charging storage batteries)

ABBOTT Mfg. Co., 2914 Central Ave., S. E., Cleveland, O.

CAMPBELL Electric Co., Lynn, Mass.

CRESCENT—See McGill Mfg. Co.

DORLAND, Leslie C., 102 Montgomery St., Poughkeepsie, N. Y.

GENERAL Electric Co., Schenectady, N. Y.

McGILL Mfg. Co., 34 Oak St., Valparaiso, Ind. "Crescent."

MANHATTAN Electrical Supply Co., New York, N. Y.
(See page 533.)

SORENSON, P., 18 Dunham Pl., Brooklyn, N. Y.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

FOOT SWITCHES

(Ignition Switch or Cut-out—to be operated by foot. For Kick Switches—See Switches, Ignition.)

HERZ & Co., New York, N. Y.
(See page 599.)

IGNITION SWITCHES

AMERICAN Motor Parts Co., 52d St. & Baltimore Ave., Philadelphia, Pa. "Ampco."

AMPCO—See American Motor Parts Co.

ATWATER Kent Mfg. Works, 4937 Stenton Ave., Philadelphia, Pa.

BRIGGS & Stratton Co., 275 Milwaukee St., Milwaukee, Wis.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CLUM Mfg. Co., Mitchell Bldg., Milwaukee, Wis.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

COUCH CO., S. H., 170 Purchase St., Boston, Mass. "Puritan."

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DELCO—See Dayton Engineering Laboratories Co.

DOW Mfg. Co., 131 Adams St., Braintree, Mass.

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex."

FAHNESTOCK Electric Co., 129 Patchen Ave., Brooklyn, N. Y.

FAULTLESS—See Motsinger Device Mfg. Co.

HANDY—See Chicago Electric Mfg. Co.

IDEAL Switch Co., Plainville, Conn.

KINGSTON—See Kokomo Electric Co.

KNOBLOCK-HEIDEMAN Mfg. Co., Sample St. & Vistula Ave., South Bend, Ind. "Quick Action."

KOKOMO Electric Co., 1415 Webster St., Kokomo, Ind. "Kingston."

MANHATTAN Electrical Supply Co., New York, N. Y.
(See page 533.)

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

MOTSINGER Device Mfg. Co., Lafayette, Ind. "Faultless."

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y.

PERFEX—See Electric Goods Mfg. Co.

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 141.)

PURITAN—See Couch Co.

QUICK ACTION—See Knoblock-Heideman Mfg. Co.

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 153.)

SPLITDORF Electrical Co., 98 Warren St., Newark, N. J.

WELLS Mfg. Co., R. C., Station A., Fond du Lac, Wis.
(See page 409.)

WICO—See Witherbee Igniter Co.

WILLIAMS, E. Q., 535-39 S. Clinton St., Syracuse, N. Y.

WITHERBEE Igniter Co., Springfield, Mass. "Wico."

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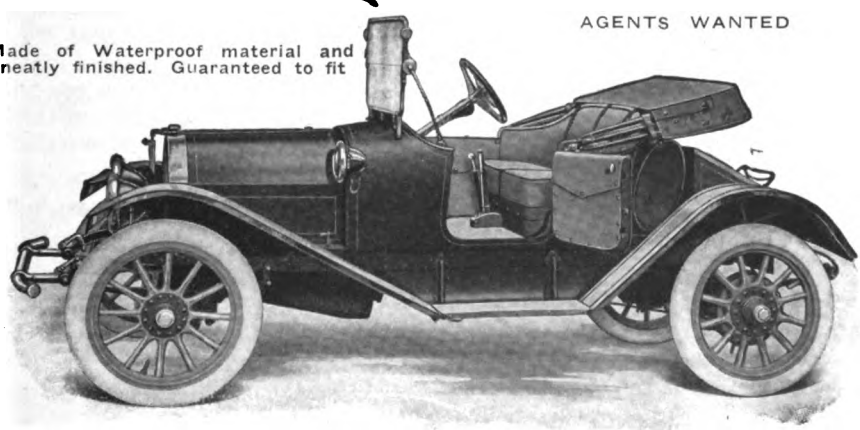

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SWITCHES (Continued)

KICK SWITCHES

(See Switches, Ignition)

LIGHT SWITCHES

(For turning on and off Electric Lights on Car)

A. B. Mfg. Co., Poughkeepsie, N. Y.

ADAMS-BAGNALL Electric Co., Cleveland, O.
(See page 243.)

BRIGGS & Stratton Co., 275 Milwaukee St., Milwaukee, Wis.

CHICAGO Electric Mfg. Co., 2817 S. Halsted St., Chicago, Ill. "Handy."

CLUM Mfg. Co., Mitchell Bldg., Milwaukee, Wis.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

COWLES & Co., C., New Haven, Conn.
(See page 177.)

CULVER-STEARNS Mfg. Co., Worcester, Mass.
(See page 243.)

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

CUTLER-HAMMER Mfg. Co., 12th St. & St. Paul Ave., Milwaukee, Wis.

DIAMOND H—See Hart Mfg. Co.

GENERAL Electric Co., Schenectady, N. Y.

H & H—See Hart & Hegeman Mfg. Co.

HANDY—See Chicago Electric Mfg. Co.

HART Mfg. Co., Hartford, Conn. "Diamond H."

HART & Hegeman Mfg. Co., 342 Capitol Ave., Hartford, Conn. "H & H."

HARTMAN Electrical Mfg. Co., Mansfield, O.

IDEAL Switch Co., Plainville, Conn.

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass.

NORTH East Electric Co., Rochester, N. Y.
(See page 601.)

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

ROSCO—See Rosen & Co.

ROSEN & Co., A. W., 610-14 Broadway, New York, N. Y. "Rosco."
(See page 153.)

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

WICO—See Witherbee Igniter Co.

WITHERBEE Igniter Co., Springfield, Mass. "Wico."

LOCK SWITCHES

(Ignition Switches equipped with lock to prevent unauthorized use of car)

AMPER Electric Co., Lockport, N. Y.

AUTO Protection Co., Peoples Gas Bldg., Chicago, Ill.

BLACKBURN Specialty Co., 1120 Prospect Ave., S. E., Cleveland, O.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

DAYTON Engineering Laboratories Co., Dayton, O. "Delco."

DELCO—See Dayton Engineering Laboratories Co.

DELTA-STAR Electric Co., 617-31 W. Jackson Blvd., Chicago, Ill.

ESCO Mfg. Co., 1000 Woodward Ave., Detroit Mich.

JOHNSTONE Auto Lock Co., 2001 Euclid Ave., Cleveland, O.

POSITIVE Tire Vulcanizer Co., 415½ Rock Island St., Davenport, Ia.

SAFETY Device Co., 372 S. Illinois St., Indianapolis, Ind.

SLY Mfg. Co., W. W., Cleveland, O.

STEERING WHEEL SWITCHES

(Ignition Switches for attachment to Steering Wheel)

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

SYSTEMS

ELECTRIC LIGHTING SYSTEMS

(See also Dynamos, Electric Lighting)

ADAMS-BAGNALL Electric Co., Cleveland, O.
(See page 243.)

ADAMS & Westlake Co., Chicago, Ill. "Adlake."
(See page 245.)

ADLAKE—See Adams & Westlake Co.

APPLE Electric Co., 16 Canal St., Dayton, O.
(See page 159.)

BAILEY Electric Co., Grand Rapids, Mich.

DEAN Electric Co., 2515 Taylor St., Elyria, O. "Dynalux."
(See page 138.)

DYNALUX—See Dean Electric Co.

DYNETO Electric Co., Syracuse, N. Y.
(See page 391.)

ECK Dynamo & Motor Co., Belleville, N. J.
(See page 409.)

ECONOMY Electric Co., Economy, Pa.

ELECTRIC Auto-Lite Co., 108 Michigan St., Toledo, O. "Fisher."
(See page 171.)

ESTERLINE Co., 228 E. South St., Indianapolis, Ind.

FISHER—See Electric Auto-Lite Co.

FISHER Electrical Works, 2000 Larned St., W., Detroit, Mich.
(See page 409.)

HARTMAN Electrical Mfg. Co., Mansfield, O.

HOLTZER-CABOT Electric Co., Brookline, Mass.
(See page 231.)

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SYSTEMS (Continued)

ELECTRIC LIGHTING SYSTEMS (Continued)

JESCO—See Jones Electric Starter Co.

JONES Electric Starter Co., 1401 W. Jackson Blvd., Chicago, Ill. "Jesco." (See page 393.)

L-N—See Leece-Neville Co.

LEECE-NEVILLE Co., 2069 E. Fourth St., Cleveland, O. "L-N."

LEONARD Electric Co., Ward, Bronxville, N. Y.

NORTH East Electric Co., Rochester, N. Y. (See page 601.)

U-S-L—See U. S. Light & Heating Co.

U. S. Light & Heating Co., 30 Church St., New York, N. Y. "U. S. L." (See page 173.)

VESTA Accumulator Co., 2100 Indiana Ave., Chicago, Ill.

WAGNER Electric Mfg. Co., 6400 Plymouth Ave., St. Louis, Mo.

WESTINGHOUSE Electric & Mfg. Co., (E. Pittsburg), Pittsburg, Pa.

TACKS

UPHOLSTERY TACKS

ATLAS Tack Co., Fairhaven, Mass.

CLEVELAND Tack Works, 1313 E. 49th St., Cleveland, O.

COBB & Drew, Plymouth, Mass.

CRANDAL, Stone & Co., Binghamton, N. Y. "Leathermet." (See page 379.)

EAGLE—See Turner & Seymour Mfg. Co.

GENESEE Tack Co., 39-57 Mt. Hope Ave., Rochester, N. Y.

GRAND Crossing Tack Co., (Grand Crossing), Chicago, Ill.

HIGGIN Mfg. Co., Newport, Ky.

LEATHERLIKE—See Turner & Seymour Mfg. Co.

LEATHERMET—See Crandal, Stone & Co.

MILONITE—See Morley Mfg. Co.

MILWAUKEE Tack Co., 27th Ave. & Wahl St., Milwaukee, Wis.

MORLEY Mfg. Co., 120 Boylston St., Boston, Mass. "Milonite."

PLYMOUTH Mills, Plymouth, Mass.

READE, Chas. W., 103 Court St., New Haven, Conn.

RIPLEY & Bartlett Co., Water St., Plymouth, Mass.

ROBERTS, G. G., South Ave., Whitman, Mass.

SALMOND & Son, Sam, Hanover, Mass.

SHELTON Co., Shelton, Conn.

TOCKWOTTON Co., 79 S. Main St., Providence, R. I.

TOWER Mfg. Co., Madison, Ind.

TURNER & Seymour Mfg. Co., Torrington, Conn. "Eagle," "Leatherlike."

WATERMAN Co., R. C., Water St., South Hanover, Mass.

TALC

TIRE TALC

AMERICAN Lava Co., Chattanooga, Tenn.

ARNSTEIN, Eugene, 46th St. & Wentworth Ave., Chicago, Ill. "Century."

ATLAS Auto Supply Co., 95 E. Adams St., Chicago, Ill. "Prevento." (See page 149.)

BESTYET—See St. Louis Rubber Cement Co.

CENTURY—See Arnstein, Eugene.

COHUTTA Talc Co., Dalton, Ga.

JEWEL See Wadsworth-Howland Co.

DOGGETT, Stanley, 11-13 Cliff St., New York, N. Y.

NEVINS Co., Samuel, 109 E. Second St., Philadelphia, Pa.

NEW YORK Mica & Mfg. Co., Auburn, N. Y. "Wright."

NORTH Carolina Talc & Mining Co., Hewitts, N. C.

NORTHWESTERN Chemical Co., Marietta, O. "Slip-Easy," "Pioneer." (See pages 143 and 551.)

PIONEER—See Northwestern Chemical Co.

PREVENTO—See Atlas Auto Supply Co.

REFLEX Ignition Co., 211 High Ave., Cleveland, O.

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "Bestyet."

SLIP-EASY—See Northwestern Chemical Co.

STEWARD Mfg. Co., D. M., Chattanooga, Tenn.

TIRE-EZE See Warren Refining Co.

U. S. Mica Mfg. Co., 234 S. La Salle St., Chicago, Ill.

WADSWORTH-HOWLAND Co., 225 Carpenter St., Chicago, Ill. "Jewel."

WARREN Refining Co., 1137 W. 11th St., Cleveland, O. "Tire-Eze."

WHITTAKER, W. H., 245 Front St., New York, N. Y.

WILLIAMS & Co., C. K., N. 13th St., Easton, Pa.

WRIGHT—See New York Mica & Mfg. Co.

TANKS

ACETYLENE TANKS

ACETYLITE Gas Co., 752 Pierce St., Milwaukee, Wis.

FIREBALL Gas Tank & Illuminating Co., 5010 Delmar Blvd., St. Louis, Mo.

GAS Tank Recharging Co., 256 Fifth St., Milwaukee, Wis. "Sun-Lite."

METEOR Auto Tank Co., 1666 Broadway, New York, N. Y.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

SEARCHLIGHT Gas Co., 1016 Karpen Blvd., Chicago, Ill.

SUN-LITE—See Gas Tank Recharging Co.

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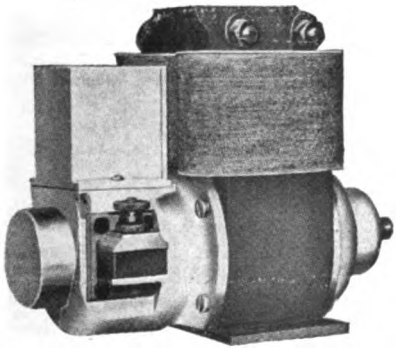

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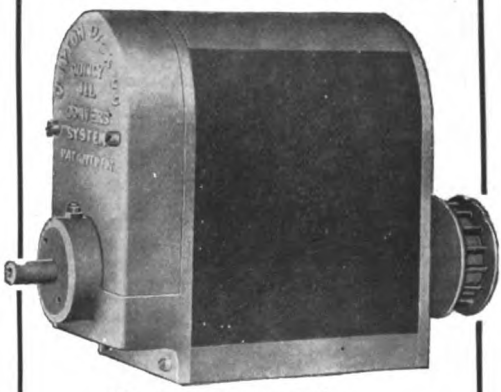

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TANKS (Continued)

EMERGENCY OR RESERVE TANKS

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DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.
(See page 467.)

FUEL AND WATER TANKS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

AIR-TIGHT Steel Tank Co., Oliver Bldg., Pittsburg, Pa.

AMERICAN Steel Package Co., Defiance, O.

AUTO Metal Co., 520 Worthington St., Springfield, Mass.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BADGER & Sons Co., E. B., 63-69 Pitts St., Boston, Mass.

BRISCOE Mfg. Co., Detroit, Mich.

BUNN-HUTCHINSON Co., 330 Prospect Ave., N. W., Cleveland, O.

BUSH Mfg. Co., Hartford, Conn.
(See page 225.)

BUSHNELL Tank Works, Bushnell, Ill.

COLUMBUS Auto Brass Co., 767 N. Fourth St., Columbus, O.

DAVIES-BACH Mfg. Co., Davies Bldg., Alliance, O.

DETROIT Auto Specialty Co., 909-11 Greenwood Ave., Detroit, Mich.

EUREKA Auto Parts Mfg. Co., 3029 Olive St., St. Louis, Mo.

FEDERAL Pressed Steel Co., Milwaukee, Wis.
(See page 169.)

FREELAND Sons Co., B. F., Sturgis, Mich.

GOETZ Co., 1802 Clybourn Ave., Chicago, Ill.

HARTFORD Sheet Metal Works, 325 N. Front St., Hartford, Conn.

HAYES Mfg. Co., Detroit, Mich.
(See pages 78 and 79.)

HEARD Mfg. Co., 1318 S. Main St., Los Angeles, Cal.

HUNT & Dorman Mfg. Co., 2102-10 Superior Ave., N. E., Cleveland, O.

IDEAL Sheet Metal Works, 2807 Michigan Ave., Chicago, Ill.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Jasco."
(See page 411.)

JASCO—See Janney, Steinmetz & Co.

KELLS Mfg. Co., W. J., 521-25 W. 45th St., New York, N. Y.
(See page 213.)

KEYSTONE Sheet Metal Co., Ambridge, Pa.

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 441.)

LAWSON Co., F. H., Cincinnati, O.

MICHIGAN Stamping Co., 759-71 Bellevue Ave., Detroit, Mich.

MITCHELL & Son, G. F., 6501 Cedar Ave., Cleveland, O.

MOLINE Stamping Co. (E. Moline), Moline, Ill.

NATIONAL Can Co., Detroit, Mich.

PARAGON Auto Parts Mfg. Co., 506 W. 53d St., New York, N. Y.

PERFEX Radiator Co., Racine, Wis.

PRESSED Steel Tank Co., West Allis, Wis.

REID Co., 1603 Second Ave., Moline, Ill.

RELIABLE Radiator Co., 451-53 E. 173d St., New York, N. Y.

SAGINAW Sheet Metal Works, Saginaw, Mich.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SCHIEDEL-THOMPSON Mfg. Co., Industrial Bldg., Indianapolis, Ind.

SUSSMAN & Rosenberg Mfg. Co., M., Tarrytown, N. Y.

TRAGESER Steam Copper Works, John, 447-57 W. 26th St., New York, N. Y.

WELDED Steel Barrel Corp., Leib & Wight Sts., Detroit, Mich.

WESTERN Drop Forge Co., Marion, Ind.
(See page 411.)

WISCONSIN Automobile Radiator Co., North Milwaukee, Wis.

NARDELL Bros. Co., 28 Broadway, Utica, N. Y.

GASOLINE STORAGE TANKS AND SYSTEMS

AIR-TIGHT Steel Tank Co., Oliver Bldg., Pittsburg, Pa.

AMERICAN Steel Package Co., Defiance, O.

AMERICAN Tank & Pump Co., Seventh & Walnut Sts., Cincinnati, O.

ANCHOR Brass Works, 141-43 W. Michigan St., Chicago, Ill. "Savo."

B. M. C.—See Butler Mfg. Co.

BEMAN Automatic Oil Can Co., Meadville, Pa.

BOWSER & Co., S. F., Fort Wayne, Ind.

BRISKIN-WOLSIEFER Mfg. Co., 541 N. Capitol Ave., Indianapolis, Ind.

BUSHNELL Tank Works, Bushnell, Ill.

BUTLER Mfg. Co., 1215-17 W. Tenth St., Kansas City, Mo. "B. M. C"

CHAMPION—See Cleveland Faucet Co.

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O. "Champion."

CLEVELAND Wire Spring Co., Cleveland, O.

COLUMBIAN Steel Tank Co., 1606 W. 12th St., Kansas City, Mo.

DELPHOS Mfg. Co., Pierce St., Delphos, O.

EASTERN Oil Tank Co., 136 Fletcher St. Lowell, Mass.

FREELAND Sons Co., B. F., Sturgis, Mich. "Pioneer."

GILBERT & Barker Mfg. Co., 26 Broadway, New York, N. Y.

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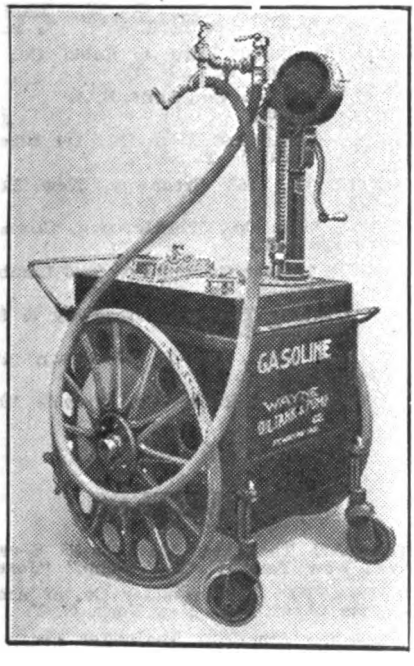

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Pump measures pints, quarts, half gallons and gallons accurately and locks automatically when tank is empty.

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TANKS (Continued)

GASOLINE STORAGE TANKS AND SYSTEMS (Continued)

HARRY Steel Co., O. K., 2333-35 Papin St., St. Louis, Mo.

HELLER-ALLER Co., Napoleon, O.

HYDRAULIC Oil Storage & Engineering Co., 22 Albany St., New York, N. Y. "Snells."

IDEAL—See Janney, Steinmetz & Co.

IDEAL—See Kupferle Bros. Mfg. Co.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Ideal."
(See page 411.)

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 441.)

KUPFERLE Bros. Mfg. Co., 600-04 N. Second St., St. Louis, Mo. "Ideal."

MILWAUKEE Oil Pump & Tank Co., Majestic Bldg., Milwaukee, Wis.

MILWAUKEE Tank Works, 146-56 Clinton St., Milwaukee, Wis.

MONITOR Mfg. Co., Landisville, Pa.

NATIONAL Store Specialty Co., Lancaster, Pa. "Pennsylvania."

NEIL & Co., Wm., 617 Division St., Chicago, Ill.

NILES Steel Tank Co., Niles, Mich.

NORWICH Storage Tank Co., Lackawanna Ave., Norwich, N. Y.

OFF & Co, Christian, 5 N. New Jersey St., Indianapolis, Ind.

PENNSYLVANIA—See National Stove Specialty Co.

PIONEER—See Freeland Sons Co.

SAVO—See Anchor Brass Works.

SCAIFE & Sons Co., Wm. B., Pittsburg, Pa.
(See page 569.)

SEXTON Can Co., Hartford & Wendell Sts., Boston, Mass.

SNELLS—See Hydraulic Oil Storage & Engineering Co.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

TAYLOR Mfg. Co., Montclair, N. J.

TIRRILL Gas Machine Lighting Co., 509 Fifth Ave., New York, N. Y.

TOKHEIM Mfg. Co., 815 N. First St., W., Cedar Rapids, Ia.

UNITED States Pump & Tank Co., 3947 Laclede Ave., St. Louis, Mo.

VAC Liquid Equipment Co., Cedar Rapids, Ia.

WALLMAN Mfg. Co., 283-87 Fifth Ave., Milwaukee, Wis.

WAYNE Oil Tank & Pump Co., Fort Wayne, Ind.
(See page 411.)

WELDED Steel Barrel Corp., Leib & Wight Sts., Detroit, Mich.

WESTERN Oil Pump & Tank Co., 2437 Kosciusko St., St. Louis, Mo.

TIRE INFLATING TANKS

BISHOP-BABCOCK-BECKER Co., Cleveland, O.
(See page 519.)

CLEVELAND Faucet Co., 708 Frankfort Ave., N. W., Cleveland, O.

LENNOX Chemical Co., 1201 E. 55th St., Cleveland, O.

LIQUID Carbonic Co., 3100 S. Kedzie Ave., Chicago, Ill.

NEW York Coach & Auto Lamp Co., 302-06 W. 53d St., New York, N. Y. "Universal."

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

UNIVERSAL—See New York Coach & Auto Lamp Co.

TIRE TESTING TANKS

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.
(See page 467.)

TAPE

INSULATING AND TIRE TAPE

BESTYET—See St. Louis Rubber Cement Co.

BLACK DIAMOND—See Dunton Co.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass. "Evergrip."

CLIFTON Mfg. Co. (Jamaica Plain), Boston, Mass.

DUNTON Co., M. W., Providence, R. I. "Black Diamond."

EVERGRIP—See Boston Woven Hose & Rubber Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

KERITE Insulated Wire & Cable Co., 30 Church St., New York, N. Y.

MATTSON Rubber Co., Lodi, N. J.
(See page 419.)

NEW York Insulated Wire Co., 114 Liberty St., New York, N. Y.

OKONITE Co., 253 Broadway, New York, N. Y.

RUSSELL Mfg. Co., Middletown, Conn.
(See page 663.)

ST. LOUIS Rubber Cement Co., 3046 Lambdin Ave., St. Louis, Mo. "Bestyet."

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VAN Cleef Bros., 7709-11 Woodlawn Ave., Chicago, Ill.

WALPOLE Tire & Rubber Co., Walpole, Mass.

TAXIMETERS

AMERICAN Taximeter Co., 735-37 Seventh Ave., New York, N. Y. "Popp," "Jones."

INTERNATIONAL Taxameter Co. of America, 239 W. 68th St., New York, N. Y.

JONES—See American Taximeter Co.

PITTSBURG Taximeter Co., Centre & Negley Aves., Pittsburg, Pa.

POPP—See American Taximeter Co.

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Solder, Wire, Spring Steel
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TEES

PIPE TEES

(See Fittings, Pipe)

TELEPHONES

LIMOUSINE TELEPHONES

(For Speaking Tubes—See Tubes, Speaking; For Annunciators—See Annunciators)

CHAU-PHONE—See Western Electric Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y.
(See page 179.)

WESTERN Electric Co., 463 West St., New York, N. Y. "Chau-Phone."

TERMINALS

WIRE TERMINALS

(See also Connectors, Battery)

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

BARCY-NICHOLSON Co., 845 Fort St., W., Detroit, Mich.

BECCO—See Michigan Motor Specialties Co.

BLISS-CHESTER Co., Providence, R. I. "Duplex."
(See page 415.)

BOSCH Magneto Co., 223 W. 46th St., New York, N. Y.

BREAZNELL, J. H., 26 Court St., Brooklyn, N. Y.
(See page 153.)

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

DUPLEX—See Bliss-Chester Co.

EUREKA—See Morse, Frank W.

EVER-READY—See American Ever Ready Co.

FAHNESTOCK Electric Co., 129 Patchen Ave., Brooklyn, N. Y.

FITZGERALD Mfg. Co., Torrington, Conn.
(See page 231.)

FRANCO Mfg. Co., 119-21 E. 16th St., Chicago, Ill.

GOODSON—See Graham Mfg. Co.

GRAHAM Mfg. Co., 94 Point St., Providence, R. I. "Goodson."

HERZ & Co., New York, N. Y.
(See page 599.)

HI-PO Waterproof Battery Co., 1007 Atlantic Ave., Brooklyn, N. Y.
(See page 65.)

J-M—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., Madison Ave. & 41st St., New York, N. Y. "J-M."

KINSEY Mfg. Co., Toledo, O.
(See page 153.)

LOMBARDI Motor Car Co., 67-71 Minerva St., Derby, Conn.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St., E., Detroit, Mich. "Becco."
(See page 523.)

MORSE, Frank W., 516 Atlantic Ave., Boston, Mass. "Eureka."

MOSLER & Co., A. R., Mt. Vernon, N. Y.
(See page 309.)

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 141.)

RAJAH Auto-Supply Co., Bloomfield, N. J.
(See page 315.)

SHAIN, Chas. D., Box 58, Station L., Brooklyn, N. Y.
(See page 507.)

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

SUPERIOR Metal Products Co., Elyria, O.
(See page 403.)

WESTERN Electric Co., 463 West St., New York, N Y.

TESTERS

BATTERY TESTERS

(See Hydrometers)

ACID TESTERS

(See Gauges, Battery)

GASOLINE TESTERS

(See Hydrometers)

THREAD

TOP AND UPHOLSTERY THREAD

AMERICAN Thread Co., 260 W. Broadway, New York, N. Y.

MEYER & Co., John C., Lowell, Mass.

SUMMIT Thread Co., Summit St., East Hampton, Conn.

TIMERS

IGNITION OR SPARK TIMERS

ALMY Water Tube Boiler Co., ft. Rhoades St., Providence, R. I.

AMERICAN Electric Co., State & 64th Sts., Chicago, Ill. "Samson."

AMERICAN Garage & Timer Co., Suffolk, Va. "Edgerton."

AMERICAN Motor Parts Co., 52d St. & Baltimore Ave., Philadelphia, Pa. "Ampco."

AMPCO—See American Motor Parts Co.

ATWATER Kent Mfg. Works, 4937 Stenton Ave., Philadelphia, Pa. "Unisparker."

BECKLEY-RALSTON Co., Michigan Ave. & Randolph St., Chicago, Ill. "Maximus."

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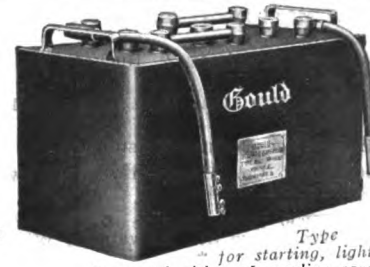

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TIMERS (Continued)

IGNITION OR SPARK TIMERS (Continued)

BEMUS—See Motor Specialties Co

BENFORD Mfg. Co., Box H., Mt. Vernon, N. Y. "Monarch."
(See page 599.)

BLACKBURN - ALLEN Co., Dayton, O. "Noxon."

BLITZ—See Electrical Specialty Mfg. Co.

BRIGGS & Stratton Co., 275 Milwaukee St., Milwaukee, Wis.

CONNECTICUT Telephone & Electric Co., Meriden, Conn.
(See page 497.)

CUNO Engineering Corp., 80 S. Vine St., Meriden, Conn.

DAYTON Engineering Laboratories Co., Dayton, O.

EDGERTON—See American Garage & Timer Co.

ELECTRIC Goods Mfg. Co., Canton, Mass. "Perfex."

ELECTRICAL Specialties Mfg. Co., 43d & Hamilton Sts., Omaha, Neb. "Blitz," "Intensifire."

HEINZE Electric Co., Lowell, Mass.
(See page 581.)

HERZ & Co., New York, N. Y.
(See page 599.)

INTENSIFIRE—See Electrical Specialties Mfg. Co.

KLAHN—See Mosler & Co.

LEHMAN Mfg. Co., J. H., 727 Seventh Ave., New York, N. Y.

LONG Bros., Broadway & Buckeye St., Kokomo, Ind.

LUNDGREN Mfg. Co., Hale Bldg., Philadelphia, Pa.

MAXIMUS—See Beckley-Ralston Co.

MELLOR Mfg. Co., Harrison Ave. & Dwight St., Springfield, Mass.

MILWAUKEE Auto Engine & Supply Co., 706-08 Winnebago St., Milwaukee, Wis.

MONARCH—See Benford Mfg. Co.

MOSLER & Co., A. R., Mt. Vernon, N. Y. "Klahn," "Umph."
(See page 309.)

MOTOR Specialties Co., Waltham, Mass. "Bemus."

NEW YORK Coil Co., 338-40 Pearl St., New York, N. Y. "Rhoades."

NOXON—See Blackburn-Allen Co.

PERFEX—See Electric Goods Mfg. Co.

PHILADELPHIA Timer & Machine Co., Philadelphia, Pa. "Velos."
(See page 525.)

PITTSFIELD Spark Coil Co., Dalton, Mass.
(See page 141.)

RHOADES—See New York Coil Co.

SAMSON—See American Electric Co.

SINTZ—See Wilmarth & Morman Co.

SPLITDORF Electrical Co., 98 Warren St., Newark, N. J.

STERLING Machine Co., Norwich, Conn. "Uncas."

STEVENS Co., E. W., 1628 Real Estate Trust Bldg., Philadelphia, Pa.
(See page 591.)

TRIO Mfg. Co., 1192-1206 Bellevue Ave., Detroit, Mich.

UMPH—See Mosler & Co.

UNCAS—See Sterling Machine Co.

UNISPARKER—See Atwater Kent Mfg. Wks.

VELOS—See Philadelphia Timer & Machine Co.

WELLS Mfg. Co., R. C., Station A, Fond du Lac, Wis.
(See page 409.)

WILMARTH & Morman Co., 1179 Monroe Ave., N. W., Grand Rapids, Mich. "Sintz."

ZIMMERMAN-SMITH Co., 72-74 Main St., North Tonawanda, N. Y.

TIPS

BURNER TIPS

(See Burners, Acetylene)

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GOODMAN Co., Herrin, Ill.

LEATHER TIRES

(For Leather Treads—See Treads, Detachable)

HORSESHOE—See Racine Auto Tire Co.

RACINE Auto Tire Co., 200 Clark St., Racine, Wis. "Horseshoe."

PNEUMATIC TIRES

(See also Tubes, Inner)

ACME Rubber Mfg Co., Trenton, N. J.

ADVANCE Tire Sales Co., 1733 Broadway, New York, N. Y.

AJAX-GRIEB Rubber Co., Trenton, N. J.

BATAVIA Rubber Co., Batavia, N. Y.

BRAENDER Rubber & Tire Co., Rutherford, N. J.

BRIARCLIFF—See Century Rubber Co.

BULL DOG—See Morgan & Marshall Rubber & Tire Co.

CARSPRING—See New Jersey Car Spring & Rubber Co.

CATARACT Rubber Co., Wooster, O.

CENTURY Rubber Co., Plainfield, N. J. "Briarcliff."
(See page 417.)

COLUMB Tyres Import Co., 1891 Broadway, New York, N. Y. (Importers.) "Prowodnik."

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

COURTNEY Tire & Rubber Co., Buick Bldg., New York, N. Y.

DIAMOND Rubber Co., Akron, O.

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San Francisco	489 Golden Gate Avenue
Atlanta, Ga.	19 Houston Street
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Cleveland, Ohio	1846 Euclid Avenue
Baltimore, Md.	1421 N. Charles Street
Buffalo, N. Y.	912 Main Street
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EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ENGLEBERT Tyre Co., 1928 Broadway, New York, N. Y. (Importers.)

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

FIRESTONE Tire & Rubber Co., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass.

FRONTIER Tire & Rubber Co., 1054 Main St., Buffalo, N. Y.

GAULOIS Tire Corp., 49 W. 64th St., New York, N. Y. (Importers.) (See page 361.)

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GREAT American Rubber Co., Conshohocken, Pa.

HARDMAN Tire & Rubber Co., Mill & Main Sts., Belleville, N. J.

HOME Tire Co., Trenton, N. J. (See page 419.)

HOOD Rubber Co., Watertown, Mass.

HORSESHOE—See Racine Auto Tire Co.

HYDRO—See St. Louis Tire & Rubber Co.

IMPERIAL—See McGraw Tire & Rubber Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

KELLY-SPRINGFIELD Tire Co., 229 W. 57th St., New York, N. Y. (See page 417.)

KNIGHT Tire & Rubber Co., Canton, O.

L. & M. Rubber Co., Chicago, Ill.

LEE Tire & Rubber Co., Conshohocken, Pa.

M. & M. Tire Co., American Mechanics Bldg., Trenton, N. J.

McGRAW Tire & Rubber Co., East Palestine, O. "Imperial."

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Tire & Rubber Co., Mansfield, O.

MARATHON Tire & Rubber Co., Front St., Cuyahoga Falls, O.

MATTSON Rubber Co., Lodi, N. J. (See page 419.)

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

MOHAWK Rubber Co., Akron, O.

MORGAN & Marshall Rubber & Tire Co., East Liverpool, O. "Bull Dog."

NASSAU—See Thermoid Rubber Co.

NATIONAL Co., 1400-10 Clybourn Pl., Chicago, Ill.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J. "Carspring."

PACKARD—See Pharis Tire & Rubber Co.

PATTERSON Rubber Co., Lowell, Mass.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

PHARIS Tire & Rubber Co., W. Main St., Newark, O. "Packard."

PORTAGE Rubber Co., Akron, O.

PROWODNIK—See Columb Tyres Import Co.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

RACINE Auto Tire Co., 200 Clark St., Racine, Wis. "Horseshoe."

RACINE Rubber Co., Racine, Wis.

REPUBLIC Rubber Co., Youngstown, O.

RUTHERFORD Rubber Co., Rutherford, N. J. "Sterling," "Spurtread."

ST. LOUIS Tire & Rubber Co., St. Louis, Mo. "Hydro."

SAVAGE Tire Co., San Diego, Cal.

SEAMLESS Rubber Co., New Haven, Conn.

SPURTREAD—See Rutherford Rubber Co.

STERLING—See Rutherford Rubber Co.

STODDARD, C. H., Worcester, Mass.

SWINEHART Tire & Rubber Co., Akron, O. (See page 417.)

TEN Broeck Tyre Co., 840 S. 26th St., Louisville, Ky.

THERMOID Rubber Co., Trenton, N. J. "Nassau." (See page 499.)

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UNITED & Globe Rubber Mfg. Cos., Trenton, N. J.

WALPOLE Tire & Rubber Co., Walpole, Mass.

ZEE Zee Tire & Rubber Co., 33d & Walnut Sts., Philadelphia, Pa.

SOLID TIRES

AMERICAN Motor Equipment Co., 27 Haverhill St., Boston, Mass.

DIAMOND Rubber Co., Akron, O.

FIRESTONE Tire & Rubber Co., Akron, O.

GAULOIS Tire Corp., 49 W. 64th St., New York, N. Y. (Importers.) (See page 361.)

GIBNEY Rubber Co., James L., Philadelphia, Pa.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

HYDRO—See St. Louis Tire & Rubber Co.

KELLY-SPRINGFIELD Tire Co., 229 W. 57th St., New York, N. Y. (See page 417.)

MILFORD Rubber Works, Milford, Ill.

MOTZ Tire & Rubber Co., Akron, O. (See page 421.)

PATTERSON Rubber Co., Lowell, Mass.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

POLACK Tyre & Rubber Co., 246 W. 59th St., New York, N. Y.

PORTAGE Rubber Co., Akron, O.

REPUBLIC Rubber Co., Youngstown, O.

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SOLID TIRES (Continued)

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(See page 417.)

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

VICTOR Rubber Co., Springfield, O.

VULCAN Rubber Co., W. Lake Rd., Erie, Pa.

SPECIAL TIRES

AMERICAN Automobile Specialty C- 510 Ashland Blvd., Chicago, Ill.

AMERICAN Spring Tire Co., 118 N. La Salle St., Chicago, Ill.

CARBONE Co., 100 State St., Albany, N. Y.

CARHART Laminated Tire Co., Moore Bldg., San Antonio, Tex.

COMFORT—See Davies-Bach Mfg. Co.

DAVIES-BACH Mfg. Co., Davies Bldg., Alliance, O. "Comfort."

DAYTON Rubber Mfg. Co., 1204 Kiser St., Dayton, O.

DIVINE Tire Co., 202 Whitesboro St., Utica, N. Y.

DUPLEX Inner Tire Co., 3147 Locust St., St. Louis, Mo.

EXPANSION Spring Rim Tire Co., 120 Boylston St., Boston, Mass.

FAVARY Tire Co., 111 Broadway, New York, N. Y.

INDIANAPOLIS Tire Co., Hume-Mansur Bldg., Indianapolis, Ind.

LEE Tire & Rubber Co., Conshohocken, Pa.

McNAULL Auto Tire Co., 507-13 Superior St., Toledo, O.

MOLLITOR Tire Co., 4241 Irving Park Blvd., Chicago, Ill.

MOTZ Tire & Rubber Co., Akron, O.
(See page 421.)

OVERMAN Tire Co., 250 W. 54th St., New York, N. Y.

PERFECT Tire Sales Co., 118 S. 16th St., Philadelphia, Pa.

PIONEER Steel Block Tire Co., Central National Bank Bldg., St. Louis, Mo.

R. & S. Tire Co., 247 Jefferson Ave., Detroit, Mich.

RELIANCE—See Stahle Mechanical Tire Co.

ST. JOHNS Rubber Tire Co., 116 Broad St., New York, N. Y.

STAHLE Mechanical Tire Co., 110 State St., Boston, Mass. "Reliance."

STEEL Cushion Tire Co., Broadway & 34th St., New York, N. Y.

SWINEHART Tire & Rubber Co., Akron, O.
(See page 417.)

TRAUTMAN'S Air-Rubber Tube Co., 129 Sixth Ave., Brooklyn, N. Y.

TOOLS

CHAIN REPAIR TOOLS

BROWN & Son, J. C., Butler, Ind.

HARRIS & Reed Mfg. Co., 1500-22 W. 15th St., Chicago, Ill.

MACQUIC—See Macdonald & Co.

NECESSITY—See Macdonald & Co.

MACDONALD & Co., J. N. Wethersfield, Conn. "Necessity." "Macquic."

ELECTRO MAGNETIC LIFTING TOOLS

For lifting bolts, nuts, etc., from cylinders, gear cases, pans, etc.)

J. & B. Mfg. Co., 65 Eagle St., Pittsfield, Mass.

SYPHER Tool Mfg. Co., 2208 Warren St., Toledo, O.

PISTON RING REMOVING TOOLS

EMPIRE—See S. B. R. Specialty Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Empire."

SWORD Mfg. Co., Main St., New London, Conn.

SPRING LEAF SEPARATING TOOLS

(For separating the spring leaves so they may be lubricated)

AUTO-SPRING Oiling Facilitator Co., 1220 E. 71st St., Cleveland, O.

DAYTON Malleable Iron Co., Dayton, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

SECURITY Reliner Co., 33 Meade St., Montgomery, N. Y.

SPRING Leaf Lubricator Co., 1002 Forest Ave., Ann Arbor, Mich.

TIRE CHAIN ATTACHING TOOLS

GEIER Co., P. A., 5112 St. Clair Ave., E., Cleveland, O.

KUMALONG—See Woodwell Co.

WOODWELL Co., Joseph, 201-03 Wood St., Pittsburg, Pa. "Kumalong."

TIRE CHAIN REPAIR TOOLS

SHELLEY Tool Co., Saranac Lake, N. Y.

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(For taking off and putting on tires)

AMERICAN Ever Ready Co., 316 Hudson St., New York, N. Y. "Ever Ready."

BECCO—See Michigan Motor Specialties Co.

BLUE Ribbon Tire Iron Co., 283-95 Fairfield Ave., Bridgeport, Conn.

BRICKEY, R. S., Aberdeen, S. Dak.

BROWN, W. H., Rose Bldg., Cleveland, O. "Jemy & Jorge."

CARLSON & Co., Charles G., 3725 Wall St., Chicago, Ill. "Star."
(See page 423.)

DAYTON Malleable Iron Co., Dayton, O.

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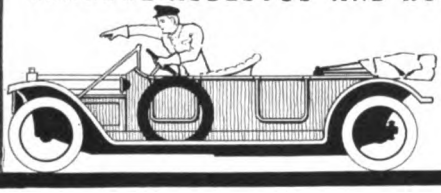

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The Motz is positively the only *easy-riding* tire that can't puncture.

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Note how these tires are made.

We use the famous "417 Formula." Costs 50% per pound more than the ordinary. And we use nearly 50% more rubber than is usual for tires of this carrying capacity.

The extra quality and extra quantity of rubber alone would insure unusual shock absorbing qualities.

But note the construction. Note the double, notched treads, the undercut sides, the slantwise bridges. These patented features add amazingly to the cushion qualities.

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The Motz Cushion Tire is used on 70% of all 1914 Pleasure Electrics.

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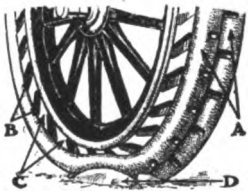

A—Shows double, notched treads.
B—Shows undercut sides.
C—Shows slantwise bridges.
D—Shows how perfectly the tire absorbs the shocks when car passes over an obstacle.

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EVER READY—See American Ever Ready Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GIANT—See M. & G. Tire Tool Co.

HOOVER Co., W. H., New Berlin, O.

IDEAL Mfg. Co., 2112 N. Sixth St., Philadelphia, Pa.

JEMY & JORGE—See Brown, W. H.

JIFFY—See R. & B. Mfg. Co.

KONIGSLOW Mfg. Co., Otto, Cleveland, O.

L. & M.—See Long Machine Works.

LONG Machine Works, Adam A., Rochester, N. Y. "L. & M."

M. & G. Tire Tool Co., 134 Washington St., Providence, R. I. "Giant."

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MICHIGAN Motor Specialties Co., 518-20 Woodbridge St. E., Detroit, Mich. "Becco."
(See page 523.)

MILLER Bros. Auto & Supply House, 1105-07 14th St., N. W., Washington, D. C. "Nelson."

MORGAN, B., John St., Newport, R. I.

MORRIS—See Pratt Mfg. Co.

NATIONAL Jack & Mfg. Co., 130-32 S. Clinton St., Chicago, Ill.

NELSON—See Miller Bros. Auto & Supply House.

NELSON, A. A., Warrenton, Va.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

O-TAK-A Tire Remover, Le Roy, N. Y.

PERFECT HANDLE—See Smith & Co.

PERFECTION Mfg. Co., New Martinsville, W. Va.

PRATT Mfg. Co., Wm. E., 35 W. Lake St., Chicago, Ill. "Morris."

R. & B. Mfg. Co., 5525 Woodland Ave., Philadelphia, Pa. "Jiffy."

RHODES Mfg. Co., S. Division St. & First Ave., Grand Rapids, Mich.

RUDOLF Tire Tool Co., 1007 James St., N. S., Pittsburg, Pa.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Empire."

SHAWVER Co., rear 31 W. Pleasant St., Springfield, O. "Springfield," "Eclipse."

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SPRINGFIELD—See Shawver Co.

STAR—See Carlson & Co.

TOBEY, Wm. L., 9 Lewis St. (E. Boston), Boston, Mass.

TOFFLER Co., S., 341 E. 136th St., New York, N. Y.

UNIVERSAL Auto-Tire Remover Co., 948 Market St., San Francisco, Cal.

WALKER-MOORE Mfg. Co., 810 Walker St., Racine, Wis.

TIRE VALVE RETHREADING TOOLS

HANSON, Henry L., 25 Union St., Worcester, Mass.

HERCULES—See Wells & Son Co.

NELSON Mfg. Co., A., 564-72 W. Randolph St., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

SUPERIOR Tap Co., Charlestown, N. H.

UTILITY—See Wells & Son Co.

WELLS & Son Co., F. E., 45 Ridell St., Greenfield, Mass. "Hercules," "Utility."

VALVE GRINDING TOOLS

ASHCROFT Mfg. Co., 85-89 Liberty St., New York, N. Y.

BIRD & Smith, 925 Santee St., Los Angeles, Cal. "Little Wonder."

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

CLEVELAND Pneumatic Tool Co., 3410 Hawthorne Ave., Cleveland, O.

FLEXIBLE Valve Remover Co., 110 W. Exchange St., Providence, R. I. "Russell."
(See page 423.)

FOOTE-BURT Co., St. Clair Ave. & 41st St., Cleveland, O.

FORD—See Wall, J. H.

IDEAL Valve Grinder Co., 1127 S. Olive St., Los Angeles, Cal.

JUST Specialty Works, J. H., 325 W. Fayette St., Syracuse, N. Y. "Simplicity."

KELLOGG Mfg. Co., 3 Circle St., Rochester, N. Y.
(See page 331.)

LITTLE WONDER—See Bird & Smith.

MALLEABLE Iron Fittings Co., Branford, Conn. "Mifco."
(See page 477.)

MIFCO—See Malleable Iron Fittings Co.

MISCH—See Motch & Merryweather Machinery Co.

MOTCH & Merryweather Machinery Co., 707 Lakeside Ave., N. W., Cleveland, O. "Misch."

OLSON Mfg. Co., 2727 O St., Lincoln, Neb.

OWEN—See Stewart & Co.

PERFECT—See Smith, Winton L.

RUSSELL—See Flexible Valve Remover Co.,

SIMPLICITY—See Just Specialty Works.

SIOUX City Machine & Tool Co., First & Virginia Sts., Sioux City, Ia.

SMITH, Winton L., 78 Clinton St., Newark, N. J. "Perfect."

STEWART & Co., 171 Broadway, New York, N. Y. "Owen."

WALL, J. H., 290 Hope St., Bristol, R. I. "Ford."

VALVE LIFTING TOOLS

ATLAS Machine Co., 110 W. Exchange St., Providence, R. I.

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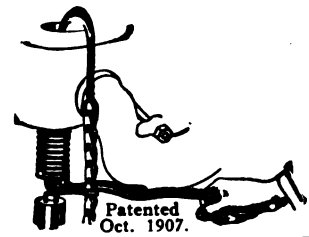

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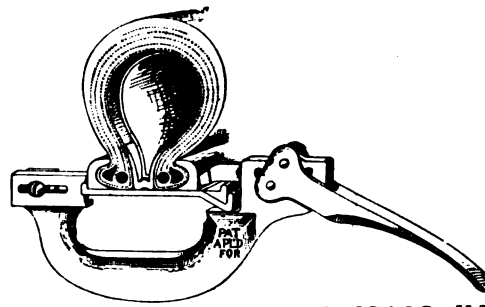

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JAMESTOWN, N. Y.

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VALVE LIFTING TOOLS (Continued)

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DAYTON Malleable Iron Co., Dayton, O.

FAY, W. B., Chicopee Falls, Mass.

FLEXIBLE Valve Remover Co., 110 W. Exchange St., Providence, R. I. (See page 423.)

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

HALLBAUER, W. M., 1537 Wellston Ave., St. Louis, Mo.

HALLGREN, Carl, 682 Summit Ave., Pasadena, Cal.

HILL—See S. B. R. Specialty Co.

HOADLEY, F. B., 479 Willow St., Waterbury, Conn.

KRAEMER—See United States Compass Co.

MECHANICAL & Electrical Mfg. Co., 2227 Prairie Ave., Chicago, Ill. "Triumph." (See page 239.)

MERTZ Co., H. B., 1408 Rutherford Ave., Pittsburg, Pa.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium." (See page 507.)

MORGAN, B., John St., Newport, R. I. "Utility."

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 355.)

NATIONAL Jack & Mfg. Co., 130-34 S. Clinton St., Chicago, Ill. "Yarwood."

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PERFECT—See Smith, Winton L.

RADIUM—See Milwaukee Auto Specialty Co.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Hill."

SJOHOLM, N. P., 11 Westmoreland Pl., St. Louis, Mo.

SMITH, Winton L., 78 Clinton St., Newark, N. J. "Perfect."

TOFFLER Co., S., 841 E. 136th St., New York, N. Y.

TRIUMPH—See Mechanical & Electrical Mfg. Co.

UNITED States Compass Co., Cedarburg, Wis. "Kraemer."

UTILITY—See Morgan, B.

YARWOOD—See National Jack & Mfg. Co.

VALVE SEATING OR FACING TOOLS

CRONE, F. G., 334 Genesee St., Buffalo, N. Y.

FOSNACHT—See National Auto Specialty Mfg. Co.

G. B. Sales Corporation, 1790 Broadway, New York, N. Y. (See page 425.)

HEALY Tool & Appliance Co., Brocton, N. Y. (See page 425.)

NATIONAL Auto Specialty Mfg. Co., Tama, Ia. "Fosnacht."

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

SARGENT Co., James M., Graniteville, Mass

TOPS

AUTOMOBILE TOPS

AMERICAN Auto Top Mfg. Co., 244-50 W. 49th St., New York, N. Y.

AMERICAN Auto Trimming Co., 669 Mack Ave., Detroit, Mich.

AMERICAN Top Co., Jackson, Mich. (See page 427.)

AMESBURY Top Co., Cedar St., Amesbury, Mass.

ANDREWS Co., E. C., 67 Church St., Boston, Mass.

ATLANTA Automobile Top & Trimming Co., 759 Whitehall St., Atlanta, Ga.

AUTO Cape Top Co., 2334 Michigan Ave., Chicago, Ill.

AUTO Top Co., 221 E. Columbia St., Fort Wayne, Ind.

AUTO Top & Body Co., 257-59 N. Broad St. Philadelphia, Pa.

BAILY & Co., S. E., 430 N. Queen St., Lancaster, Pa.

BALTIMORE Buggy Top Co., 107-13 W. Mt. Royal Ave., Baltimore, Md.

BARNES-CURTISS Co., 147-49 W. 99th St., New York, N. Y.

BIEHLS Auto Top Co., 31 S. Fifth St., Reading, Pa.

BISON Trimming Co., 1185 Jefferson St., Buffalo, N. Y.

BLACK Hawk Auto Top Co., 405 W. Fifth St., Waterloo, Ia.

BLISS Auto Top Co., C. P., 2308 Walnut St., Denver, Colo.

BLUE Ribbon Auto & Carriage Co., 1720 Fairfield Ave., Bridgeport, Conn.

BOHNET & Co., John, Grand Ave. & Washtenaw St., Lansing, Mich.

BOYER-SCHLISKE Co., 1171 Van Dyke Ave., Detroit, Mich.

BRIGGS Carriage Co., Cedar St., Amesbury, Mass.

BROWNELL & Burt, 12 Washington St., Taunton, Mass.

BUOB & Scheu, 410 Court St., Cincinnati, O.

CAPITOL Body Co., Ray St. & Madison Ave., Indianapolis, Ind.

CENTRAL Auto Top Co., 330 N. Illinois St., Indianapolis, Ind.

CHANSLOR & Lyon Top Co., 945-47 S. Main St., Los Angeles, Cal.

CHICAGO Carriage & Trimming Co., 1908 Indiana Ave., Chicago, Ill.

CHICAGO Coach & Carriage Co., 1223-31 S. Michigan Ave., Chicago, Ill.

COLLINGS Carriage Co., Front & Arch Sts., Camden, N. J.

COLLINS & Son, G. A., Main & Church Sts., Akron, O.

COOLING Carriage Co., 402 French St., Wilmington, Del.

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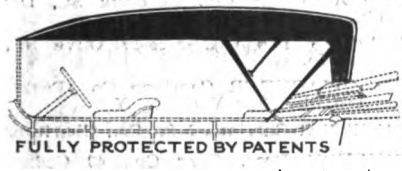

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DALLAS Buggy Top Co., 562 Main St., Dallas, Tex.

DETROIT Motor Car Supply Co., 1280 Jefferson Ave., Detroit, Mich.

DUSTIN Auto Top & Slip Lining Co., 1200 Broadway, Denver, Colo.

ECKLAND Bros., 110½ Sixth St., S., Minneapolis, Minn.

ELMWOOD Auto Top & Supply Co., 707 Main Ave., Elmwood Place, O.

ENNIS, W. G., 18 Cumberland St., Charleston, S. C.

EUREKA Co., Rock Falls, Ill.

FALLS City Buggy Top Co., 128-30 S. Floyd St., Louisville, Ky.

FARNHAM & Nelson Co., 47 Union Ave., Boston, Mass.

FEHRING Carriage Co., 601-09 Third St., Columbus, Ind.

FRANK, W. H., 22-24 Harrison St., New Rochelle, N. Y.

GATES Mfg. Co., Indianapolis, Ind.

GLOVER Equipment Co., Indianapolis, Ind.
(See page 367.)

GOLDE-PATENT Mfg. Co., 509-15 W. 56th St., New York, N. Y.

HAWES Storm Front Co., 14 N. Monroe St., Coldwater, Mich.

HOLBROOK Co., West End Ave. & 67th St., New York, N. Y.

HOLCKER-ELBERG Mfg. Co., Kansas City, Mo.

HOLCOMB Co., 105 Goffe St., New Haven, Conn.

INDIANA Top & Vehicle Co., Lawrenceburg, Ind.

INDIANAPOLIS Auto Top Co., Washington St., Indianapolis, Ind.

IROQUOIS Auto Top Co., 401-07 Columbia St., Utica, N. Y.

IRVIN Mfg. Co., R. J., Morris & Division Sts., Indianapolis, Ind.

JACKSON Top Co., Jackson, Mich.

JEWETT-GAMAGE Co., 172-74 Shrewsbury St., Worcester, Mass.

KETTERER Co., C. P., 211-15 W. 19th St., New York, N. Y.

KEYSTONE Vehicle Co., Reading, Pa.
(See page 81.)

KINGSBURY-LEAHY Co., 131-33 Hudson Ave., Albany, N. Y.
(See page 81.)

KROH Mfg. Co., C. Z., 1212-14 Jackson Ave., Toledo, O.

LA DUE Auto Top Co., 1109 Monroe St., Toledo, O.

LANE, T. W., Amesbury, Mass.

LONDON Auto Supply Co., 2540-48 Wabash Ave., Chicago, Ill.

LONGDIN & Brugger Co., Fond-du-Lac, Wis.

LOUD, Fred A., Franklin & Lansdowne Sts., Cambridge, Mass.

McDONALD Bros., 1009-11 E. Pike St., Seattle, Wash.

MANHATTAN Top & Body Co., 221-26 W. 64th St., New York, N. Y.

MANN-ALDRICH Carriage Co., 1300 Lincoln St., Denver, Colo.

MATT & Co., F., 491 Washington St., Newark, N. J.

MICHIGAN Top Co., 313 Riopelle St., Detroit, Mich.

MILWAUKEE Trimming Co., 549 E. Water St., Milwaukee, Wis.

MONAHAN Vehicle Co., Kinsley Ave. & Eagle St., Providence, R. I.

MOUNT Co., J. W., Maple Ave. & White St., Red Bank, N. J.

MURRAY & Co., P. A., Newton, Mass.

NATIONAL Auto Top Co., 244-50 W. 49th St., New York, N. Y.

NATIONAL Auto Top Co., 1601 W. Broad St., Richmond, Va.

NEWTON & Son, W. H., 135 Elm St., Cortland, N. Y.

NORRIS Co., R. Milton, 516-18 W. Baltimore St., Baltimore, Md.

NOVELTY Carriage Works, 315-17 Second Ave., Spokane, Wash.

OHIO Top Co., 909-11 Broadway, Cincinnati, O.

PEERLESS Buggy Top Co., York St. & Central Ave., Cincinnati, O.

PEERLESS Top & Supply Co., 411-13 W. 55th St., New York, N. Y.

RAND'S Mfg. Co., 67-69 Fort St., E., Detroit, Mich.

REARDON, J. J., Clark St., Amesbury, Mass.

REYNOLDS Mfg. Co., E. W., 709-11 S. 15th St., Omaha, Neb.

ROBBINS & Co., Irvin, 11th & Canal Sts., Indianapolis, Ind.
(See page 81.)

ROSS & Browne, 6127-29 Cottage Grove Ave., Chicago, Ill.

RUCH Auto Top Co., Third & Sidney Aves., Mt. Vernon, N. Y.

RUDD Auto Top Co., 46 Bagg St., Detroit, Mich.

ST. LOUIS Top Co., 3025-29 Olive St., St. Louis, Mo.

SCHILDWACHTER Carriage Co., Park Ave. & 128th St., New York, N. Y.

SCHREIBER Carriage Mfg. Co., Chariton, Ia.

SCHUBERT Bros. Gear Co., 43 Cedar St., Oneida, N. Y.

SHARRER Patent Top Co., 245 W. 55th St., New York, N. Y.
(See page 425.)

SHIELDS Carriage Co., 11 Carriage Ave., Amesbury, Mass.

SIEDER Mfg. Co., 31-33 E. Woodbridge St., Detroit, Mich.

SIMON Auto Top Mfg. Co., S., 310 E. 17th St., Kansas City, Mo.

SNOW, Newell H., 171 State St., Binghamton, N. Y.

SNOW-MOSS Co., 147 W. 33d St., New York, N. Y.

SPRAGUE Umbrella & Mfg. Co., Norwalk, O.

SPRINGFIELD Auto Top & Upholstering Co., 224-30 Dwight St., Springfield, Mass.

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SPRINGFIELD Metal Body Co., Springfield, Mass.
(See page 140.)

STANDARD Top & Equipment Co., 1212 Huron Rd., Cleveland, O.

STERLING Auto Top Co., Detroit, Mich.

STONE & Sons, C., 1658-74 Ogden Ave., Chicago, Ill.

SUGNET, Geo. W., 297-301 Oak St., Buffalo, N. Y.

SUTORIUS Auto Top Co., 621-23 Third Ave., S., Minneapolis, Minn.

THOMPSON Co., E. J. (Forbes Field), Pittsburg, Pa.

VALENTINE, J. S., 432-38 Princeton Ave., Trenton, N. J.

VEHICLE Top & Supply Co., 3414 Lindell Ave., St. Louis, Mo. "Vesco."

VESCO—See Vehicle Top & Supply Co.

VETTER Auto Top Co., 95-97 West End Ave., New York, N. Y.

WALKER & Co., Alfred J., 223 W. 66th St., New York, N. Y.

WARNER Pole & Top Co., 1646-50 Central Ave., Cincinnati, O.

WAYNESBURG Carriage Co., Waynesburg, O.

WEBER Co., M., 218-20 N. St. Clair St., Dayton, O.

WEISS & Son, Chas., 4715-19 Cottage Grove Ave., Chicago, Ill.

WERNER & Sons, Geo., 1133-37 Main St., Buffalo, N. Y.

WILLIAMS Top Co., 1814 Commerce St., Dallas, Tex.

WRIGHT & Co., C. E., Norfolk, Va.

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A. S. B.—See Queen Mfg. Co.

BRICTSON Mfg. Co., Brookings, S. D.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

COLORADO Tire & Leather Co., 1340 Acoma St., Denver, Colo. "Durable."

DAVIS Robe & Armor Co., 8 N. State St., Chicago, Ill.

DURABLE—See Colorado Tire & Leather Co.

ECONOMY Tread Co., 113 Lenox Ave., New York, N. Y.

GOODYEAR Tire & Rubber Co., Akron, O.

HERCULES—See Republic Rubber Tire & Shoe Co.

INVINCIBLE—See Pacific Leather Works.

INVINCIBLE Puncture Proof Tire Co., 53 Sabin St., Providence, R. I.

KIMBALL Tire Case Co., 168 Broadway, Council Bluffs, Ia.

LEATHER Tire Goods Co., Niagara Falls, N. Y. "Woodworth."
(See page 663.)

MANSFIELD Tire & Rubber Co., Mansfield, O.

MAPLEBAY Mfg. Co., Crookston, Minn.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

PACIFIC Leather Works, 239 12th St., Oakland, Cal. "Invincible," "Zig-Zag."

QUEEN Mfg. Co., Webster City, Ia. "A. S. B."

REPUBLIC Rubber Tire & Shoe Co., 152 W. 55th St., New York, N. Y. "Hercules."

SAMPSON Tire Protector Mfg. Co., Grand Island, Neb.

SLAMA Tire Protector Co., 1504 Grand Ave., Kansas City, Mo.

STANDARD Tire Protector Co., Akron, O.

TRIPLE Tread Mfg. Co., 1545 Michigan Ave., Chicago, Ill.

TWENTIETH Century Tire Protector Co., Midlothian, Tex.

UNIVERSAL Tire Protector Co., Angola, Ind.

WOODWORTH—See Leather Tire Goods Co.

X-X-X Auto Accessory Co., Springfield, Mass.
(See page 599.)

ZIG-ZAG—See Pacific Leather Works.

TREATING

HEAT TREATING

AMERICAN Metal Treatment Co., Elisabeth, N. J.
(See page 413.)

BIDLE Co., W. S., Cleveland, O.

BRIDGEPORT Metal Treating Co., 125 Stratford Ave., Bridgeport, Conn.

SCOTT, C. U., Davenport, Ia.

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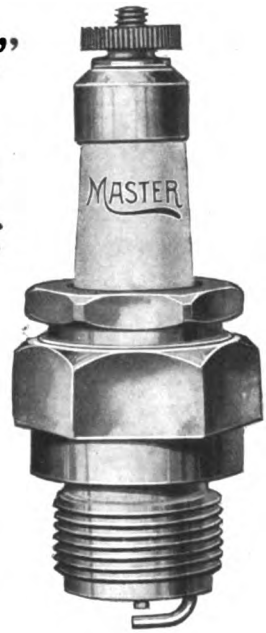

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BRIDGEPORT Coach Lace Co., 17th St. & Fourth Ave., New York, N. Y.

CARR Co., F. S., Boston, Mass. (See page 299.)

CHANDLER Oil Cloth & Buckram Co., East Taunton, Mass.

CHASE & Co., L. C., Boston, Mass. (See page 439.)

DUSENBURY & Co., Louis, 222 Fourth Ave., New York, N. Y.

FINE Woolen Co., 58-60 Worth St., New York, N. Y.

GALLAND, Wechmar & Co., 456 Fourth Ave., New York, N. Y.

GERHAB, Jacob, 158-64 N. Third St., Philadelphia, Pa.

GIFFORD & Son, John A., 25 Park Pl., New York, N. Y.

HOOF Co., C. M., 317 W. Randolph St., Chicago, Ill.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa.

KENNEDY, Willing & Co., 524 Arch St., Philadelphia, Pa.

LAIDLAW, Jr., Wm. R., 126-32 W. 46th St., New York, N. Y. (See page 251.)

LANDERS Bros. Co., Toledo, O. (See page 107.)

LOUNSBERY & Sons, G. H., 107-09 W. Third St., Cincinnati, O.

MOSSMAN, Yarnelle & Co., Fort Wayne, Ind.

MUTTY Co., L. J., Boston, Mass. (See page 133.)

NORRIS & Sons, R. W., 342-48 N. Gay St., Baltimore, Md.

PARRY & Co., A. N., Amesbury, Mass.

PATTERSON & Greenough, 45 E. 17th St., New York, N. Y.

ROEHM & Davison, Woodbridge & Wayne Sts., Detroit, Mich.

ROGERS & Co., E. F., 410 Arch St., Philadelphia, Pa.

SCHERER & Co., H., Detroit, Mich.

SCHLEGEL Mfg. Co., College Ave. & N Goodman St., Rochester, N. Y.

SHERWOOD, A. S., 754-56 Seventh Ave., New York, N. Y.

SHIRLEY Auto Fabric Co., 38-40 W. 32d St., New York, N. Y.

SLOANE, W. & J., Fifth Ave. & 47th St., New York, N. Y.

TEN EICK, Cornelius, 253 W. 47th St., New York, N. Y.

TIEL & Co., Geo., 413 Arch St., Philadelphia, Pa.

VOGT Mfg. & Coach Lace Co., 408-10 St. Paul St., Rochester, N. Y.

WIESE & Co., Wm., 234 W. 55th St., New York, N. Y.

METAL TRIMMINGS

(See also Fasteners, Curtain; also Fittings, Top; also Forgings, Drop; also Handles, Door; also Hinges, Door; also Locks, Door; also Irons, Slat; also Irons, Top; also Mouldings, Brass; also Rests, Bow; also Separators, Bow)

AMESBURY Brass & Foundry Co., Amesbury, Mass.

ATTWOOD Brass Works, Scribner & Bowery Sts., Grand Rapids, Mich. (See page 341.)

CHICAGO-RACINE Aluminum, Brass & Iron Works, 224-30 W. Huron St., Chicago, Ill.

COWLES & Co., C., New Haven, Conn. (See page 177.)

DOUGLAS & Lomason Co., Detroit, Mich.

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

ENTERPRISE Brass & Plating Co., 2838-44 Spring Grove Ave., Cincinnati, O.

HIGGIN Mfg. Co., Newport, Ky.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill. (See page 135.)

METAL Stamping Co., 13th St. & Boulevard, Long Island City, N. Y.

MONARCH Carriage Goods Co., 2838-44 Spring Grove Ave., Cincinnati, O.

MURDOCK, Jr., Co., Jas., 116 Opera Pl., Cincinnati, O.

MURPHY Co., G. W. J., Merrimac, Mass.

PHOENIX Lock Works, 321-27 Third Ave., Newark, N. J.

SHERWOOD, A. S., 754-56 Seventh Ave., New York, N. Y.

SMITH & Co., Jos. N., Detroit, Mich. (See page 98.)

TAYLOR Co., H. D., 101-05 Oak St., Buffalo, N. Y.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WHITE Mfg. Co., Bridgeport, Conn.

WING Co., Charles, Amesbury, Mass. (See page 507.)

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn.

TRUCKS

REPAIR TRUCKS

(For lying on when making repairs underneath a car

AUTO. & Accessories Mfg. Co., 816 W. North Ave., Baltimore, Md. "Norwood."

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

E-Z ROLLER—See Rice & Dayton Mfg. Co.

FAW, J. H., 41 Warren St., New York, N. Y. (See page 585.)

FRENCH, F. A., Braddock Ave. & Guthrie St., Pittsburg, Pa. "Getunder."

GETUNDER—See French, F. A.

HERCULES—See La Porte Mat & Mfg. Co.

IDEAL—See Lewis-Geer Mfg. Co.

Complete Index to Classification appears on Pages 8 to 22.

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LINK-BELT

Silent Chain Drives

For Automobile Engines

Flexible as a Belt—Positive as a Gear
More efficient than either

The increase of efficiency, the decrease of friction, the elimination of noise are the essential qualities which have occasioned the adoption of Silent Chain by leading motor engineers of Europe and America for driving cams, valves, magnetos, generators, air pumps, and for connecting electric starters and all motor auxiliaries. In addition, Silent Chain is finding extensive application in gear boxes and as the main drive for gasoline and electric trucks.

For these purposes it is an ideal medium of transmission. It operates almost noiselessly during its entire life and does not have the increasing noisiness of gears. Although absolutely positive in its action, Link-Belt Silent Chain contains a certain amount of initial elasticity which relieves the rotating parts of shock and vibration, and the resulting wear due to both. The slight amount of lost motion in a worn motor, either in the crank or auxiliary shaft, does not increase the noise of the drive.

Write for Catalog No. 168

and new book Booklet 182 giving complete data for figuring Link-Belt Silent Chain Drives.

LINK-BELT COMPANY

INDIANAPOLIS, INDIANA

PHILADELPHIA **CHICAGO**

New York.....299 Broadway
Boston .....131 State Street
Pittsburgh.....1501-3 Park Building
St. Louis.....Central National Bank Building
Buffalo.....698 Ellicott Square
Birmingham.....General Machy. Co.
Seattle .....512½ First Avenue S.
Denver.....Lindrooth, Shubart & Co.
San Francisco.....Meese & Gottfried Co.
New Orleans.....Wilmot Machinery Co.
Los Angeles.....204 N. Los Angeles St.
Minneapolis.....Link-Belt Supply Co.

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TRUCKS (Continued)

REPAIR TRUCKS (Continued)

KEYSTONE Wire Matting Co., Beaver Falls, Pa.

LA PORTE Mat & Mfg. Co., La Porte, Ind. "Hercules."

LEWIS-GEER Mfg. Co., Ypsilanti, Mich. "Ideal."
(See page 465.)

MASCO—See Milwaukee Auto Specialty Co.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco."
(See page 507.)

MOTOR & Mfg. Works Co., Dunkirk, N. Y.
(See page 219.)

NORWOOD—See Auto. & Accessories Mfg. Co.

PORTLAND Garage Co., 49-51 Cross St., Portland, Me.

RICE & Dayton Mfg. Co., 115-19 E. Fourth St., Cedar Falls, Ia. "E-Z Roller."

SIMPLEX Auto Specialty Co., 733 Woodward Ave., Detroit, Mich.

TRUNKS

LEATHER, FABRIC AND BOARD TRUNKS

AJAX Trunk & Sample Case Co., 91-93 Mercer St., New York, N. Y.

AMERICAN Vulcanized Fibre Co., Wilmington, Del. "Vul-Cot."
(See page 179.)

AUTO Trunk Mfg. Co., 94 Reade St., New York, N. Y.

BAL, Wm., 14 Johnston St., Newark, N. J.

BELBER Trunk & Bag Co., 1645 N. Hancock St., Philadelphia, Pa.

BERG Auto Trunk & Specialty Co., 237-39 Lafayette St., New York, N. Y.

BOYLE & Co., John, 112-14 Duane St., New York, N. Y.

DUPLEX—See Planet Co.

FARMERS Market Co., 711 Orange St., Wilmington, Del.

FITZGERALD Trunk Co., 1214 Wells St., Chicago, Ill.

FULLER Co., G. W., 182-84 Asylum St., Hartford, Conn.

HASKELL Bros., 109 N. Wabash Ave., Chicago, Ill.

HEADLEY & Farmer Co., Newark, N. J.

INDESTRUCTO—See National Veneer Products Co.

KAMLEE Co., 247 Broadway, Milwaukee, Wis.
(See page 433.)

KING, W. A., 52 Public Sq., Cleveland, O.

KRONAUER & Co., Chas., 152 N. Desplaines St., Chicago, Ill.

MARVIN Auto Trunk Co., 68 Thomas St., New York, N. Y.

MASCO—See Milwaukee Auto Specialty Co.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Masco."
(See page 507.)

MORRISON & Co., L. E., 27 W. Washington St., Indianapolis, Ind.

NATIONAL Veneer Products Co., Mishawaka, Ind. "Indestructo."

PLANET Co., Westfield, Mass. "Duplex."

PROGRESS Trunk Mfg. Co., Philadelphia, Pa.

STALLMAN, F. A., 57 E. Spring St., Columbus, O.

TAYLOR Trunk Works, C. A., 39 E. Randolph St., Chicago, Ill.

VUL-COT—See American Vulcanized Fibre Co.

WARREN Leather Goods Co., 80 Austin St., Worcester, Mass.

WINSHIP, W. W., 71 Summer St., Boston, Mass.

WOHLFELD Trunk & Bag Co., 538-40 N. Third St., Philadelphia, Pa.

METAL TRUNKS

A-Z Co., 530 W. 56th St., New York, N. Y.
(See page 333.)

IMPERIAL—See Welch & Suthergreen.

NATIONAL Enameling & Stamping Co., 374-78 Broadway, New York, N. Y. "Nesco."

NESCO—See National Enameling & Stamping Co.

WELCH & Suthergreen, 80 Lunenburg St., Fitchburg, Mass. "Imperial."

TUBES

INNER TUBES

(For Complete Tires—See Tires, Pneumatic)

ACME Rubber Mfg. Co., Trenton, N. J.

AMERICAN Tire & Rubber Co., 70-78 Beach St., Akron, O.

BATAVIA Rubber Co., Batavia, N. Y.

BRAENDER Rubber & Tire Co., Rutherford, N. J.

BRIARCLIFF—See Century Rubber Co.

BROWN Scientific Tube Co., Broadway & 72d St., New York, N. Y.

BUFFALO Rubber Mfg. Co., Sussex Ave. & Erie R. R., Buffalo, N. Y.

BULL DOG—See Morgan & Marshall Rubber & Tire Co.

CENTURY Rubber Co., Plainfield, N. J. "Briarcliff," "Cre-Pa-Ra."
(See page 417.)

CLOVER LEAF—See Howe Rubber Co.

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa.
(See page 419.)

CRE-PA-RA—See Century Rubber Co.

DE LUXE—See Thermoid Rubber Co.

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ENDURANCE Tire & Rubber Co., New Brunswick, N. J.

ENGLEBERT Tyre Co., 1928 Broadway, New York, N. Y. (Importers).

FALLS Rubber Co., Cuyahoga Falls, O.

FEDERAL Rubber Mfg. Co., Milwaukee, Wis.

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KAMLEE AUTO TRUNK

Built by Trunk Makers who are Motorists

Demanded by particular car owners because of its many exclusive features, its sterling construction and high-class appearance. Adopted by many leading automobile manufacturers as a part of their regular or optional equipment because the Kamlee is an attractive, dependable trunk that is worthy of being carried by the finest car ever built.

KAMLEE—No. 3000 Closed

Dust-Proof — Rain-Proof — Rust-Proof

All Kamlee trunks are made of three ply basswood veneer, the only material that will not warp, crack or split under the most trying weather conditions. Bear this in mind in making trunk comparisons.

The improved interlocking edge makes the Kamlee absolutely **Dust-Proof, Rain-Proof, Mud-Proof.** The seamless black enamelled duck covering sheds water like a duck's back.

Leather corners and binding combined with nickeled solid brass trimmings give a refined appearance found in no other trunk. And the new patent lock-lever is "the last word" in convenience for fastening and locking the lid. No straps or buckles to unfasten.

As to convenience no other trunk can compare with the Kamlee.

Furnished in regular and special models to fit all makes and types of cars. Also tire trunks and running board trunks.

Every Automobile Dealer and Manufacturer will find interesting facts in the Kamlee catalog. Write for our proposition.

KAMLEE—No. 3000 Open

THE KAMLEE COMPANY

247 Broadway, Milwaukee, Wis.

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TUBES (Continued)

INNER TUBES (Continued)

FIRESTONE Tire & Rubber Co., Akron, O.

FISK Rubber Co., Chicopee Falls, Mass.

FRONTIER Tire & Rubber Co., 1054 Main St., Buffalo, N. Y.

GOODRICH Co., B. F., Akron, O.

GOODYEAR Tire & Rubber Co., Akron, O.

GORDON Rubber Co., Canton, O.

HERCULES Rubber Co., 1-2 Hudson St., New York, N. Y.

HOME Tire Co., Trenton, N. J. (See page 419.)

HOOD Rubber Co., Watertown, Mass.

HOWE Rubber Co., New Brunswick, N. J. "Clover Leaf."

IMPERIAL—See McGraw Tire & Rubber Co.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

KEYSTONE Rubber Mfg. Co., 125-41 E. 11th St., Erie, Pa.

KNIGHT Tire & Rubber Co., Canton, O.

KOKOMO Rubber Co., Kokomo, Ind.

L. & M. Rubber Co., Chicago, Ill.

M. & M. Tire Co., American Mechanics Bldg., Trenton, N. J.

McGRAW Tire & Rubber Co., East Palestine, O. "Imperial."

MAC-WEB—See Webster-MacDonnell Co.

MANHATTAN Rubber Mfg. Co., Passaic, N. J.

MANSFIELD Tire & Rubber Co., Mansfield, O.

MARATHON Tire & Rubber Co., Front St., Cuyahoga Falls, O.

MATTSON Rubber Co., Lodi, N. J. (See page 419.)

MICHELIN Tire Co., Milltown, N. J.

MILLER Rubber Co., Akron, O.

MOHAWK Rubber Co., Akron, O.

MORGAN & Marshall Rubber & Tire Co., East Liverpool, O. "Bull Dog."

NASSAU—See Thermoid Rubber Co.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

PACKARD—See Pharis Tire & Rubber Co.

PATTERSON Rubber Co., Lowell, Mass.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

PERFECTION Auto Tube Co., 1622 Broadway Denver, Colo.

PHARIS Tire & Rubber Co., W. Main St., Newark, O. "Packard."

PORTAGE Rubber Co., Akron, O.

QUAKER City Rubber Co., 629 Market St., Philadelphia, Pa.

RACINE Rubber Co., Racine, Wis.

ROME Hollow Wire & Tube Co., Rome, N. Y.

RUTHERFORD Rubber Co., Rutherford, N. J. "Sterling."

SEAMLESS Rubber Co., New Haven, Conn.

SLADE Mfg. Co., Providence, R. I.

STERLING—See Rutherford Rubber Co.

TEN Broeck Tyre Co., 840 S. 26th St., Louisville, Ky.

THERMOID Rubber Co., Trenton, N. J. "De Luxe," "Nassau." (See page 499.)

TRIPLEX Tube Co., 60 State St., Boston, Mass.

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

UNITED & Globe Rubber Mfg. Cos., Trenton, N. J.

VAIL-OSGOOD Rubber Co., 27th & La Salle Sts., Chicago, Ill.

WALPOLE Tire & Rubber Co., Walpole, Mass.

WEBSTER-MACDONNELL Co., 98 Washington St., Haverhill, Mass. "Mac-Web."

ZEE Zee Tire & Rubber Co., 33d & Walnut Sts., Philadelphia, Pa.

SPEAKING TUBES

(For Limousine Telephones—See Telephones, Limousine
For Annunciators—See Annunciators)

BRIDGEPORT Coach Lace Co., 17th St. & Fourth Ave., New York, N. Y.

COLUMBIA—See Horstmann Co.

COWLES & Co., C., New Haven, Conn. (See page 177.)

ENGLISH & Mersick Co., 154-60 Winchester Ave., New Haven, Conn.

HORSTMANN Co., Wm. H., Fifth & Cherry Sts., Philadelphia, Pa. "Columbia."

LAW Engineering & Specialty Mfg. Co., Rochester, N. Y. (See page 217.)

PERPENTE Mfg. Co., State & Wall Sts., New Haven, Conn.

SCHLEGEL Mfg. Co., College Ave. & N. Goodman St., Rochester, N. Y.

TUBING

ALUMINUM TUBING

ALUMINUM Co. of America, Pittsburg, Pa.

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia, Pa.

BRASS AND COPPER TUBING

AMERICAN Brass Co. (Ansonia Brass & Copper Branch), Ansonia, Conn.

AMERICAN Brass Co. (Coe Brass Branch), Torrington, Conn.

AMERICAN Brass Co. (Benedict & Burnham Branch), Waterbury, Conn.

AMERICAN Brass Co. (Waterbury Brass Branch), 26 Crane St., Waterbury, Conn.

AMERICAN Brass Co. (Kenosha Branch), Kenosha, Wis.

AMERICAN Tube Works, 10 Oliver St., Boston, Mass.

BALTIMORE Tube Co., Baltimore, Md.

Complete Index to Classification appears on Pages 8 to 22.

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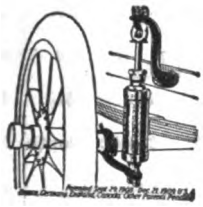

Patented Sept. 29, 1908, Dec. 21, 1909, U. S. A., France, Germany, England, Canada. Other patents pending.

WHY NOT ENJOY ABSOLUTE COMFORT IN YOUR AUTOMOBILE OVER ALL KINDS OF ROADS?

You can accomplish this if your automobile is equipped with THE NEW 1912 FLENTJE AUTOMATIC HYDRAULIC JOUNCE AND RECOIL PREVENTERS—"BEST IN THE WORLD."

In a short time you will save the cost of the preventers on tires and springs, and engine and body of your car. Try a set on thirty days' free trial and three years' guarantee, and be convinced of the correctness of my claims. $5,000.00 a side to any shock absorber manufacturer to disprove that "The Flentje" is not the best in the world. *For further particulars, apply to*

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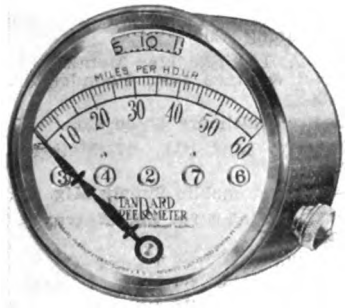
1643 Cambridge Street, Cambridge, Mass.

New York Branch, 1926 Broadway, corner 64th Street

ROOM 400 **NEW YORK CITY**



THE STANDARD SPEEDOMETER

(TRADE MARK)

Has more valuable and up-to-date features than any other instrument at any price; namely:
Indicates accurately speeds from zero up.
Can be attached to either wheel.
Indicates speed and mileage when backing.
Trip Odometer can be sent forward or back.
It is equipped with our universal pivot joint.
Correct driving gear ratio for all wheels.

PRICES:

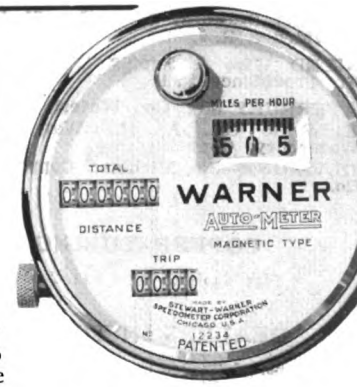
3	inch	40	mile	$25.00	4	inch	80 mile $50.00
3	"	60	"	$30.00	3	"	Clock Set $75.00
4	"	60	"	$40.00	4	"	" " $90.00

Standard Thermometer Co., 65 Shirley St., Boston, Mass.

Successors to Parker Mfg. Co.

WARNER AUTO-METER

Magnetic Type



AT the recent Importers' Show, the New York Automobile Show, the Chicago Show, the recent French Automobile Show and the London Automobile Show, the magnetic speedometer was again on the greatest number of cars.

If you could follow the local automobile shows, from city to city all over America, you would find the vast majority of high grade cars at every individual show, equipped with Warner (magnetic) Auto-Meters.

Over *90% of the world's leading automobile* manufacturers use the Warner in preference to every other type of speedometer.

You can have a Warner on the car you buy if you insist on it.

Sole manufacturers of the magnetic speedometer.

The Stewart-Warner Speedometer Corporation

FACTORIES: **BELOIT, WISCONSIN** **CHICAGO, ILLINOIS**

Branches and Service Stations in all principal cities.

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TUBING (Continued)

BRASS AND COPPER TUBING (Continued)

BARCALO Mfg. Co., Buffalo, N. Y.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn.
(See page 329.)

CHASE Rolling Mill Co., Waterbury, Conn.

CORNELIS & Gridley, Wolcott St., Waterbury, Conn.

DETROIT Copper & Brass Rolling Mills, Clark Ave. below Wabash R. R., Detroit, Mich.

ERIE-BUFFALO Tube Co., 18th & Cranberry Sts., Erie, Pa.
(See page 437.)

FRENCH Mfg. Co., 142 Robbins St., Waterbury, Conn.

HORN Co., M. T., 82-86 Park Pl., New York, N. Y.

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia, Pa.

MACKENZIE-WALTON Co., Pawtucket, R. I.

MICHIGAN Copper & Brass Co., 1611 Jefferson Ave. W., Detroit, Mich. "Wolverine."

NATIONAL Brass & Copper Tube Co., 41 Park Row, New York, N. Y.

NEW Jersey Tube Co., Newark, N. J.

RANDOLPH-CLOWES Co., Waterbury, Conn.

ROME Brass & Copper Co., Rome, N. Y.

ROME Hollow Wire & Tube Co., Rome, N. Y.

STANDARD Brass & Copper Tube Co., New London, Conn.

UNIFORM Seamless Wire Co., 71 Peck St., Providence, R. I.

UNITED Wire & Supply Co., 109 Summer St., Providence, R. I.

WATERBURY Mfg. Co., Waterbury, Conn.

WELLS & Co., A. H., Watertown Rd., Waterbury, Conn.

WOLVERINE—See Michigan Copper & Brass Co.

COPPER TUBING

(See Tubing, Brass and Copper)

DEALERS IN TUBING

(This is a list of Dealers in Tubing who advertise in this publication)

FRASSE & Co., Peter A., New York, N. Y.
(See page 589.)

MORRIS & Co., E. K., 311-17 W. Second St., Cincinnati, O.
(See page 437.)

RUTTER & Co., Arthur T., 256-57 Broadway, New York, N. Y.
(See page 601.)

FIBRE TUBING

(See Fibre, Hard)

FLEXIBLE METALLIC TUBING

ALMOND Mfg. Co., T. R., 1 Maple Ave., Ashburnham, Mass.
(See page 437.)

AMERICAN Metal Hose Co., Waterbury Conn.

ATLANTIC Tubing Co., 1756 Cranston St., Providence, R. I.

AUTOMOBILE Supply Mfg. Co., 220 Taaffe Pl., Brooklyn, N. Y. "Rubes."

BALTIMORE Tube Co., Baltimore, Md. "Riflex."

BREEZE Carbureter Co., 250-52 South St., Newark, N. J.

DUOFLEX—See Fischer Spring Co.

FISCHER Spring Co., Chas., 88-90 Walker St., New York, N. Y. "Duoflex."

LOMBARDI Motor Car Co., 67-71 Minerva St., Derby, Conn.

METAL Hose & Tubing Co., 17 Battery Pl., New York, N. Y.

OSBORNE & Stephenson Mfg. Co., W. Main St., Plainville, Conn.
(See page 331.)

PENNFLEX—See Pennsylvania Flexible Metallic Tubing Co.

PENNSYLVANIA Flexible Metallic Tubing Co., Broad & Race Sts., Philadelphia, Pa. "Pennflex."

RIFLEX—See Baltimore Tube Co.

RILEY-KLOTZ Mfg. Co., 17 Mulberry St., Newark, N. J.

RUBES—See Automobile Supply Mfg. Co.

STANDARD Metal Mfg. Co., Newark, N. J.
(See page 227.)

U. S. Flexible Metallic Tubing Co., 450 E. Third St., Los Angeles, Cal.

RUBES—See Automobile Supply Mfg. Co.

HARD RUBBER TUBING

(See Rubber, Hard)

IRON-LINED BRASS TUBING

PHENIX Tube Co., 182 N. 11th St., Brooklyn, N. Y.

ROME Mfg. Co., Railroad St., Rome, N. Y.

SOFT RUBBER TUBING

ACME Rubber Mfg. Co., Trenton, N. J.

ATLANTIC Tubing Co., 1756 Cranston St., Providence, R. I.

BOSTON Woven Hose & Rubber Co., 110 Portland St., Cambridge, Mass.

BOWERS Rubber Works, 68-70 Sacramento St., San Francisco, Cal.

CANFIELD Rubber Co., Bridgeport, Conn.

CINCINNATI Rubber Mfg. Co., Cincinnati, O.
(See page 585.)

COMBINATION Rubber Mfg. Co., Bloomfield, N. J.

CONTINENTAL Rubber Works, Erie, Pa.
(See page 419.)

DIAMOND Rubber Co., Akron, O.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

ENDURANCE Tire & Rubber Co., New Brunswick, N. J.

ESSEX Rubber Co., Trenton, N. J.

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Seamless Brass and Copper Tubes

Best Quality

Prompt Delivery

THE ERIE-BUFFALO TUBE CO.
18th & CRANBERRY STS.,
ERIE, PA.

Seamless Steel TUBING

For Automobile and Mechanical Construction.

STEEL AND IRON

for all special purposes.

Great assortment and large stock carried.

E. K. Morris & Co.

311-313-315-317 W. 2d St.

CINCINNATI, Ohio

"DETROIT"

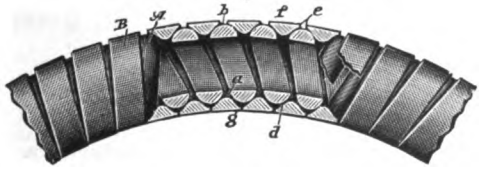
Cold Drawn Seamless Steel MECHANICAL TUBING

For Axles—Steering Gears—Torsion Tubes—Spacers, Etc.

DETROIT SEAMLESS STEEL TUBES CO.
DETROIT, MICH.

BEST SPEEDOMETER SERVICE
WHEN ALMOND CASING PROTECTS THE SHAFT

Fig. 2.



ALMOND FLEXIBLE SPEEDOMETER CASING.
NOTE THE SUBSTANTIAL CONSTRUCTION.

Jar, Rust and Strain Proof.
Affords Proper and Positive Protection to Shaft under all conditions.

ALMOND FLEXIBLE TUBING

FOR CONVEYING
OIL, GASOLINE, PREST-O-LITE GAS AND GREASE.

T. R. ALMOND MFG. CO.
1 MAPLE AVE., ASHBURNHAM, MASS.

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TUBING (Continued)

SOFT RUBBER TUBING (Continued)

FEDERAL Rubber Mfg Co., Milwaukee, Wis.

GOODRICH Co., B. F., Akron, O.

HAMILTON Rubber Mfg. Co., Trenton, N. J.

HODGMAN Rubber Co., 876 Broadway, New York, N. Y.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

LIBERTY & Nicholls Mfg. Co., East Norwalk, Conn.

MATTSON Rubber Co., Lodi, N. J. (See page 419.)

MECHANICAL Rubber Co., C. & P. & Nickel Plate R. R., Cleveland, O.

MILFORD Rubber Works, Milford, Ill.

MILLER Rubber Co., Akron, O.

MINERALIZED Rubber Co., 165 Chambers St., New York, N. Y.

NATIONAL India Rubber Co., Bristol, R. I.

NEW Jersey Car Spring & Rubber Co., Wayne & Brunswick Sts., Jersey City, N. J.

NEW York Belting & Packing Co., 91 Chambers St., New York, N. Y.

PARKER, Stearns & Co., 286 Sheffield Ave., Brooklyn, N. Y.

PENNSYLVANIA Rubber Co., Jeannette, Pa.

SEAMLESS Rubber Co., New Haven, Conn.

STANDARD Rubber & Cable Co., Bridgeport, Conn.

THERMOID Rubber Co., Trenton, N. J. (See page 499.)

TYER Rubber Co., Andover, Mass. "Tyrian."

TYRIAN—See Tyer Rubber Co.

UNITED States Tire Co., Broadway & 58th St., New York, N. Y.

WALPOLE Tire & Rubber Co., Walpole, Mass.

STEEL TUBING

AMERICAN Tube & Stamping Co., Bridgeport, Conn.

BECKER Steel Co. of America, 90 West St., New York, N. Y. (Importers.)

DELAWARE Seamless Tube Co., Auburn, Pa.

DETROIT Seamless Steel Tubes Co., Detroit, Mich. (See page 437.)

GLOBE Seamless Steel Tubes Co., 33d Ave. & Burnham St., Milwaukee, Wis.

IVINS Tube Works, Elwood, Oak Lane Station, Philadelphia, Pa.

KRUPP—See Prosser & Son.

NATIONAL Tube Co., Frick Bldg., Pittsburg, Pa. "Shelby."

OHIO Seamless Tube Co., Shelby, O.

PITTSBURG Seamless Tube Co., Beaver Falls, Pa.

PITTSBURGH Steel Products Co., Frick Annex, Pittsburg, Pa.

PROSSER & Son, Thomas, 15 Gold St., New York, N. Y. (Importers.) "Krupp." (See page 395.)

SHELBY—See National Tube Co.

STANDARD Steel Tube Co., Toledo, O.

STANDARD Welding Co., Cleveland, O. (See Book Mark.)

TURN-BUCKLES

WROUGHT TURN-BUCKLES

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

DETROIT Screw Works, Detroit, Mich. (See page 661.)

EBERHARD Mfg. Co., Cleveland, O. (See page 237.)

HASKELL Mfg. Co., Wm. H., 451 Main St., Pawtucket, R. I.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

MERRILL Bros., Maspeth, N. Y.

MICHIGAN Bolt & Nut Co., ft. Meldrum Ave., Detroit, Mich.

NEW England Bolt & Steel Co., Bowdoin St. (Everett), Boston, Mass.

PAWTUCKET Mfg. Co., 327 Pine St., Pawtucket, R. I.

PENINSULAR Milled Screw Co., Champlain St. & Canton Ave., Detroit, Mich.

UNION Elevator & Machine Co., 215-17 W. Ontario St., Chicago, Ill.

WILCOX, Crittenden & Co., 383 Main St., Middleton, Conn.

TURNTABLES

AUTOMOBILE TURNTABLES

(See also Castors and Wheel Trucks).

BEACH Auto Turntable Co., T. C., 313 Lansing St., St. Johns, Mich.

BICYCLE Step Ladder Co., 6 W. Randolph St., Chicago, Ill. "Murray."

CANTON Foundry & Machine Co., Canton, O. "Universal." (See page 479.)

ELLIOTT Co., Sterling, Newton, Mass.

ERNST'S Sons, C. F., 75 Lathrop St., Buffalo, N. Y.

LANSING Co., Lansing, Mich.

LINK-BELT Co., Indianapolis, Ind. (See page 431.)

MURRAY—See Bicycle Step Ladder Co.

NICOLS & Bro., George P., Old Colony Bldg., Chicago, Ill.

NORTHERN Engineering Works, 2 Chene St., Detroit, Mich.

PERFECTION—See Zering Mfg. Co.

PITLESS Auto Turntable Co., 1316 W. Ninth St., Kansas City, Mo.

PORTLAND Garage Co., 49-51 Cross St., Portland, Me.

SMITH Iron Co., G. W. & F., Gerard St., Boston, Mass.

TURNER Machine Co., 28-32 Maple Ave., Danbury, Conn.

UNITED Casting Co., Wilson & Violet Sts., Los Angeles, Cal.

UNIVERSAL—See Canton Foundry & Machine Co.

ZERING Mfg. Co., H., 528-30 Reading Rd., Cincinnati, O. "Perfection."

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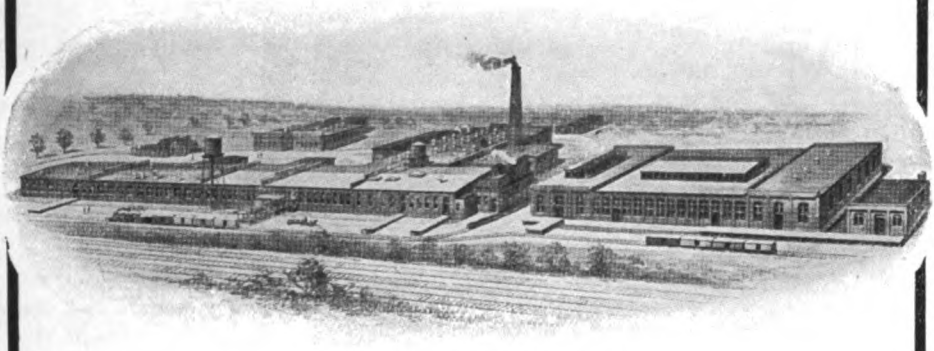

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MEYER & Co., John C., Lowell, Mass.

TRAVERS Twine & Cordage Co., 81 Warren St., New York, N. Y.

UNIONS

PIPE UNIONS

(See Fittings, Pipe)

TUBING UNIONS

CRUM-WILEY Mfg. Co., Peru, Ind.

DOLE Valve Co., 208 N. Fifth Ave., Chicago, Ill.

HANCOCK Mfg. Co., 770 Henry St., Charlotte, Mich.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

LAVIGNE Mfg. Co., Detroit, Mich.
(See page 441.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

RICHARDSON-PHENIX Co., 122-28 Reservoir Ave., Milwaukee, Wis. "Union Cinch."

UNION CINCH—See Richardson-Phenix Co.

WILLIAMS Valve Co., D. T., Spring Grove Ave., & Township St., Cincinnati, O.

ZERK Mfg. Co., Cleveland, O.

VALVES

ANGLE, GLOBE, CHECK AND GATE VALVES

BASHLIN Co., Warren, Pa.

BELFIELD Co., H., 425 N. Broad St., Philadelphia, Pa.

BUCKEYE Iron & Brass Works, 324 E. Third St., Dayton, O.

CRANE Co., 836 S. Michigan Ave., Chicago, Ill.

DETROIT Brass Works, 2000 Brooklyn Ave., Detroit, Mich.

DETROIT Lubricator Co., Lincoln Ave. & G. T. R. R., Detroit, Mich.

JARECKI Mfg. Co., Erie, Pa.

JENKINS Bros., 80 White St., New York, N. Y.

KELLY & Jones Co., Greensburg, Pa.

KENNEDY Valve Mfg. Co., Elmira, N. Y.

KINSEY & Mahler Co., 400 S. Adams St., Peoria, Ill.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

McDONALD Mfg. Co., A. Y., Dubuque, Ia.

McNAB & Harlan Mfg. Co., 56 John St., New York, N. Y.

MILWAUKEE Valve Co., 139 Burrell St., Milwaukee, Wis.

PITTSBURG Valve Foundry & Construction Co., 26th St. & A. V. Ry., Pittsburg, Pa.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

QUEEN City Brass & Iron Works, Spring Grove Ave., Cincinnati, O.

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STEPHENS Mfg. Co., Roe, Clayton & Parkinson Aves., Detroit, Mich.

WALWORTH Mfg. Co., Boston, Mass.
(See page 559.)

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

BALL CHECK VALVES

CRUM-WILEY Mfg. Co., Peru, Ind.

IMPERIAL Brass Mfg. Co., Harrison St. & Centre Ave., Chicago, Ill.
(See page 135.)

LIGGETT Spring & Axle Co., Park Bldg., Pittsburg, Pa.
(See page 383.)

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

GAS ENGINE VALVES

(For Valves in the rough—See Forgings, Drop)

ELECTRIC Welding Products Co., Cleveland, O.
(See page 572.)

LEWIS Electric Welding & Mfg. Co., Toledo, O.
(See page 443.)

MICHIGAN Engine Valve Co., Detroit, Mich.
(See page 441.)

MORGAN, B., John St., Newport, R. I.

RICH Tool Co., 410 Railway Exchange, Chicago, Ill.

SCHLIEDER Mfg. Co., Detroit, Mich.
(See page 539.)

GASOLINE LOCK VALVES

ESCO Mfg. Co., 1000 Woodward Ave., Detroit, Mich.

GASOLOCK Co., 982 Woodward Ave., Detroit, Mich.

GLOBE Auto Lock Co., Canisteo, N. Y.

HILL—See Janney, Steinmetz & Co.

HILL—See Norwalk Iron Works Co.

HUNTER Auto Safety Lock Co., Hodges Bldg., Detroit, Mich.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Hill."
(See page 411.)

NORWALK Iron Works Co., South Norwalk, Conn. "Hill."

WILLSTAD Mfg. Co., 6717 Sangamon St., Chicago, Ill.

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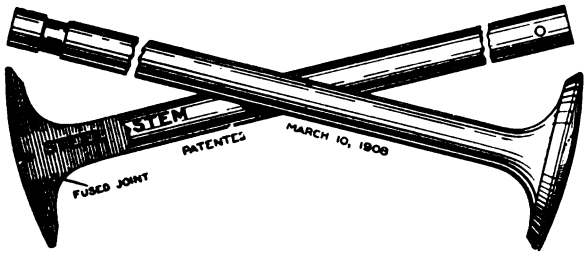

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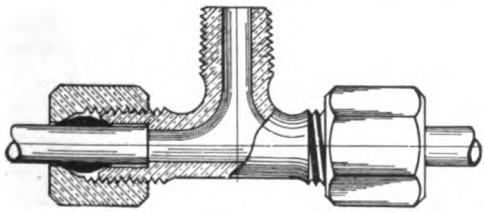

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VALVES (Continued)

GATE VALVES

(See Valves, Angle)

GLOBE VALVES

(See Valves, Angle)

MIXING VALVES

(See Vaporizers)

MUFFLER CUT-OUT VALVES

APCO—See Auto Parts Co.

AUTO Parts Co., 50 Exchange Pl., Providence, R. I. "Apco."

BARCO Brass & Joint Co., 226-30 N. Jefferson St., Chicago, Ill.

DUPLEX—See Western Brass Mfg. Works.

EMPIRE—See S. B. R. Specialty Co.

ESSEX—See S. B. R. Specialty Co.

F & K—See Findeisen & Kropf Mfg. Co.

FINDEISEN & Kropf Mfg. Co., 21st & Rockwell Sts., Chicago, Ill. "Husk," "Rudie," "F & K."

FOWLER Lamp & Mfg. Co., 61 E. 24th St., Chicago, Ill.

G. P.—See Piel Co.

GABRIEL Horn Mfg. Co., 1407 40th St., N. E., Cleveland, O.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco."
(See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GRAY-HAWLEY Mfg. Co., 937-43 Jefferson Ave., Detroit, Mich.

HANDY—See Lunkenheimer Co.

HUSK—See Findeisen & Kropf Mfg. Co.

HUSK—See Western Brass Works.

INTERNATIONAL Automobile Supply Co., 117 W. South Water St., Chicago, Ill.
(See page 585.)

LINCOLN Machine Shops, Lincoln, Ill.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O. "Handy."

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium."
(See page 507.)

MOTOR & Mfg. Works Co., Dunkirk, N. Y.
(See page 219.)

NOONAN Tool & Machine Works, A. S., 130-36 St. James St., Rome, N. Y.

PIEL Co., G., 13th St. & Boulevard, Long Island City, N. Y. "G. P."

POWELL Muffler & Timer Co., 42 La Fayette St., Utica, N. Y.
(See page 453.)

RADIUM—See Milwaukee Auto Specialty Co.

RUDIE—See Findeisen & Kropf Mfg. Co.

RUDIE—See Western Brass Mfg. Works.

S. B. R. Specialty Co., 17-19 Princeton St., East Orange, N. J. "Essex," "Empire."

STANHOPE Forge & Machine Works, 49-51 Lansdowne St., Cambridge, Mass.

STAR Brass Works, 1721-23 Baltimore Ave., Kansas City, Mo.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. "Husk," "Rudie," "Duplex."
(See page 97.)

YANKEE Co., Utica, N. Y.
(See page 581.)

NEEDLE VALVES

AMERICAN Brass & Iron Co., Crystal St. & Trombley Ave., Detroit, Mich.

DETROIT Brass Works, 2000 Brooklyn Ave., Detroit, Mich.

LUNKENHEIMER Co., 223 E. Eighth Ave., Cincinnati, O.

POWELL Co., Wm., 2521-31 Spring Grove Ave., Cincinnati, O.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

PRESSURE REGULATING VALVES

(See Regulators, Pressure)

STEAM SAFETY VALVES

AMERICAN Steam Gauge & Valve Mfg. Co., 203 Camden St., Boston, Mass.

ASHTON Valve Co., 271 Franklin St., Boston, Mass.
(See page 239.)

STAR Brass Mfg. Co., 108-14 E. Dedham St., Boston, Mass.

STEPHENS Mfg. Co., Roe, Clayton & Parkinson Aves., Detroit, Mich.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

STEAM THROTTLE VALVES

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

TIRE VALVES

BURKE Valve Co., 233 The Arcade, Cleveland, O.

DIEN, Ch., 17 Battery Pl., New York, N. Y. (Importer.) "Edco."

EDCO—See Dien, Ch.

POTTER—See Standard Engineering Works.

ST. LOUIS Pneumatic Valve Co., 4148 Olive St., St. Louis, Mo.

SCHRADER'S Son, A., 783-91 Atlantic Ave., Brooklyn, N. Y.
(See page 443.)

STANDARD Engineering Works, 59 Social St., Woonsocket, R. I. "Potter."

STEVENS Mfg. & Supply Co., 1223-27 Wabash Ave., Chicago, Ill.

TIRE SAFETY VALVES

ARTIZAN Brass Co., 218 N. Jefferson St., Chicago, Ill.

SALUS—See Sioux City Machine & Tool Co.

SIOUX City Machine & Tool Co., First & Virginia Sts., Sioux City, Ia. "Salus."

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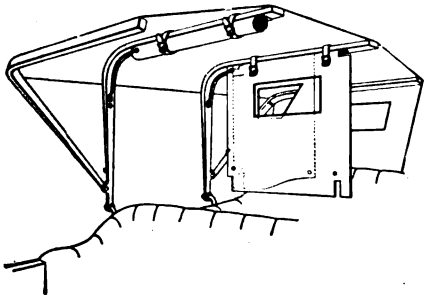

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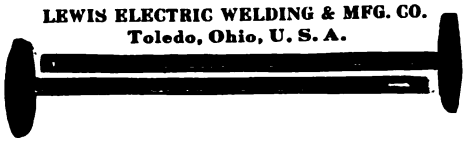

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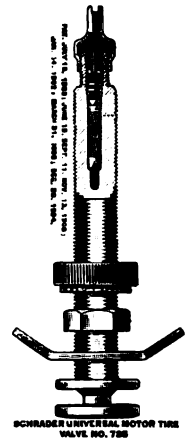

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MONARCH Valve Co., 112 Front St., Brooklyn, N. Y.

NONPAREIL—See Lunkenheimer Co.

WILKINSON Co., Wm. H., West Medway, Mass.

WILLIAMS Valve Co., D. T., Spring Grove Ave. & Township St., Cincinnati, O.

VARNISHES

AKRON Varnish Co., Akron, O.

AMERICAN Varnish Co., 1133 N. Branch St., Chicago, Ill.

ANGLO - AMERICAN Varnish Co., 53-63 Johnson St., Newark, N. J.

ARMITAGE & Co., John L., Newark, N. J.

ATLANTIC Varnish Works, Richmond, Va.

AULT & Wiborg Co., New, Seventh & Culvert Sts., Cincinnati, O. "Rubfast."

BAY STATE—See Wadsworth, Howland & Co.

BECKWITH-CHANDLER Co., 320 Fifth Ave., New York, N. Y.

BERRY Bros., Detroit, Mich.

BILLINGS-CHAPIN Co., Cleveland, O.

BOSTON Varnish Co., Everett, Mass.

BROOKS & Co., Clarence, 249-77 Chestnut St., Newark, N. J.

BUCKEYE Paint & Varnish Co., 15th & Lucas Sts., Toledo, O.

BULLS-EYE—See Zinsser & Co.

CHASE, Roberts & Co., Fifth St. & West Ave., Long Island City, N. Y. "Kismet."

CHI-VAR-CO—See Chicago Varnish Co.

CHICAGO Varnish Co., 2100 Elston Ave., Chicago, Ill. "Chi-Var-Co."

CINCINNATI Varnish Co., 211 South St., Cincinnati, O.

CLEVELAND Varnish Co., 3111 E. 87th St., Cleveland, O. "Frelastic."

COLUMBUS Varnish Co., Columbus, O.

CROCKETT Co., David B., 277 Mt. Grove Ave., Bridgeport, Conn.

DEVOE & C. T. Raynolds Co., F. W., 101 Fulton St., New York, N. Y.

ELMENDORF Varnish Co., 845 Larrabee St., Chicago, Ill.

EMPIRE Varnish Co., 2638-42 E. 76th St., Cleveland, O.

FLINT Varnish Works, Flint, Mich.

FLOOD & Conklin Co., 136 Chestnut St., Newark, N. J. "Radium."

FOREST City Paint & Varnish Co., 3334 Lakeside Ave., Cleveland, O.

FRELASTIC—See Cleveland Varnish Co.

FRENCH & Co., Samuel H., York Ave., Fourth & Callowhill Sts., Philadelphia, Pa.

GILLESPIE & Son, Chas. H., 19 Dey St., Jersey City, N. J.

GLIDDEN Varnish Co., W. Madison Ave. & L. S. & M. S. Ry., Cleveland, O.

GRAVES Co., N. Z., 22-26 S. Third St., Philadelphia, Pa.

GREGG Varnish Co., St. Louis, Mo.

HARLAND & Son, Wm., Genesee St. & Erie Canal, Buffalo, N. Y. "Whitest."

HILDRETH Varnish Co., 90 West St., New York, N. Y.

HOTOPP Varnish Co., First & Marshall Sts., Hoboken, N. J.

KISMET—See Chase, Roberts & Co.

LUCAS & Co., John, 322-30 Race St., Philadelphia, Pa.

MASURY & Son, John W., New York, N. Y.

MOLLER & Schumann Co., Marcy & Flushing Aves., Brooklyn, N. Y.

MOORE & Co., Benjamin, 231-33 Front St., Brooklyn, N. Y.

MOUND City Paint & Color Co., 11th & Mullanphy Sts., St. Louis, Mo.

MURPHY Varnish Co., Chestnut & McWhorter Sts., Newark, N. J.

PARROTT Varnish Co., 453 N. Washington Ave., Bridgeport, Conn.

PAYSON Varnish Co., 141st St. & Walnut Ave., New York, N. Y.

PRATT & Lambert, Buffalo, N. Y.

QUEEN City Varnish Co., Cincinnati, O.

RADIUM—See Flood & Conklin Co.

RICKER-BENNETT Co., 37 Harris St. (N. Cambridge), Cambridge, Mass.

RUBFAST—See Ault & Wiborg Co.

SCHRACK & Co., C., 152 N. Fourth St., Philadelphia, Pa.

SHERWIN-WILLIAMS Co., 100 Canal St., Cleveland, O.

SMITH & Co., Edward, Sixth St. & West Ave., Long Island City, N. Y.

STANDARD Varnish Works (Elm Park), Port Richmond, N. Y.

STEWART-MOWRY Co., 3214 Shields Ave., Chicago, Ill.

STULB Varnish Co., Joseph, Haddon Ave. & White Horse Pike, Camden, N. J.

VALENTINE & Co., 456 Fourth Ave., New York, N. Y. "Vanadium."

VANADIUM—See Valentine & Co.

WADSWORTH, Howland & Co., 84 Washington St., Boston, Mass. "Bay State."

WHEELER Varnish Works, 2260 Elston Ave., Chicago, Ill.

WHITEST—See Harland & Son.

ZINSSER & Co., W., 195 William St., New York, N. Y. "Bulls-Eye."

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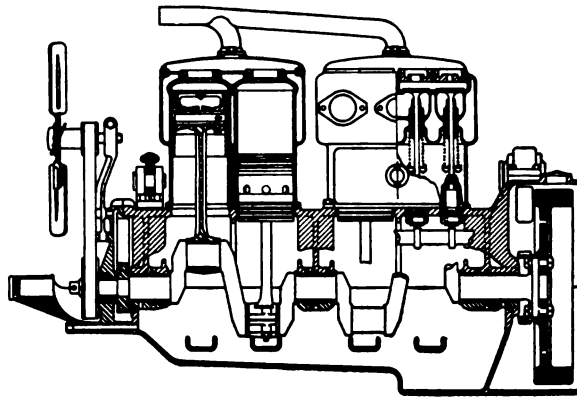

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VENTILATORS

LIMOUSINE AND FORE DOOR VENTILATORS

COWLES & Co., C., New Haven, Conn. (See page 177.)

DOUGLAS & Lomason Co., Detroit, Mich.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

O'BRIEN Mfg. Co., Joseph F., 63 Park Pl., New York, N. Y. (See page 179.)

OCHSNER & Sons Co., A., 1060 State St., New Haven, Conn.

SMITH & Co., Jos. N., Detroit, Mich. (See page 93.)

UNIQUE Findings & Supply Co., 36 Garnet St., Providence, R. I.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WIND SHIELD VENTILATORS

SECURITY Co., 30 Shingiss St., Pittsburg, Pa.

VOLTMETERS

(See Ammeters; also Gauges, Battery)

VULCANIZERS

PORTABLE VULCANIZERS

ADAMSON Mfg. Co., East Palestine, O. "Universal."

AUTO Steam Vulcanizer Co., Cincinnati, O.

BROWN Co., 213 Bellevue Ave., Syracuse, N. Y.

DIAMOND Mfg. Co., Equitable Bldg., Des Moines, Ia.

ECONOMY—See Garage Equipment Mfg. Co.

ELECK-TRICK—See Gibney Rubber Co.

ELECTRIC Vulcanizer Co., 618 Third Ave. S., Minneapolis, Minn. "Minneapolis."

FEDERAL Auto Accessories Co., Union National Bank Bldg., Columbus, O. "S.S.S."

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Economy." (See page 221.)

GIBNEY Rubber Co., James L., Philadelphia, Pa. "Eleck-Trick."

GILLILAND Auto Supply Co., D. C., 3355 S. Grand Ave., St. Louis, Mo.

GILSON Motor Starting Co., 1407-09 N. Illinois St., Indianapolis, Ind.

GRAY Specialty Co., 148 Avon Ave., Newark, N. J.

GREENS—See Star Specialty Mfg. Co.

GWINN-BACON Vulcanizer Co., 34-37 Arsenal St., St. Louis, Mo.

HILL Pump Valve Co., 18-20 E. Kinzie St., Chicago, Ill.

HILL-STAGE Co., 604 Jackson St., Anderson, Ind.

HIPWELL Mfg. Co., 831-35 North Ave., W., Pittsburg, Pa. (See page 231.)

HOUSEL Mfg. Co., East Rochester, N. Y. "Never Fail."

KENMORE Mfg. Co., 15 N. 40th Ave., Chicago, Ill.

LEADER Mfg. Co., 3049 W. 25th St., Cleveland, O.

LITTLE WONDER—See Rice & Dayton Mfg. Co.

McVEY Mfg. Co., Dayton, O. (See page 507.)

MAPES, Lee C., 16 Fulton Ave, Rochester, N. Y.

MASCOT—See National Motor Supply Co.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MINNEAPOLIS—See Electric Vulcanizer Co.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O. "Mascot," "Wizard."

NEVER FAIL—See Housel Mfg. Co.

NEW Process Vulcanizer Co., 3230 Monroe St., Toledo, O. "Vul-car."

POSITIVE Tire Vulcanizer Co., 415½ Rock Island St., Davenport, Ia.

RICE & Dayton Mfg. Co., 115-19 E. Fourth St., Cedar Falls, Ia. "Little Wonder."

S.S.S.—See Federal Auto Accessories Co.

SHALER Co., C. A., 903 Fourth St., Waupun, Wis. "Vul-Kit," "Stitch-In-Time."

SIMPLEX Vulcanizer Co., 2422 Manderson St., Omaha, Neb.

SIMPLICITY Supply Co., 2187 E. Second St., Cleveland, O.

STAR Specialty Mfg. Co., 227-33 W. Erie St., Chicago, Ill. "Greens."

STITCH-IN-TIME—See Shaler Co.

U. S. Auto Supply Co., 182 Grand River Ave., Detroit, Mich. "Uneeda." (See page 405.)

UNEEDA—See U. S. Auto Supply Co.

UNIVERSAL—See Adamson Mfg. Co.

VUL-CAR—See New Process Vulcanizer Co.

VUL-KIT—See Shaler Co.

WESTERN Brass Mfg. Works, Marshall Blvd., 21st St. & C. B. & Q. R. R., Chicago, Ill. (See page 97.)

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

WIZARD—See National Motor Supply Co.

SHOP VULCANIZERS

AKRON-WILLIAMS—See Williams Foundry & Machine Co.

ALLEN—See Diamond Mfg. Co.

AUTO Tire Vulcanizing Co., Lawrence St., Lowell, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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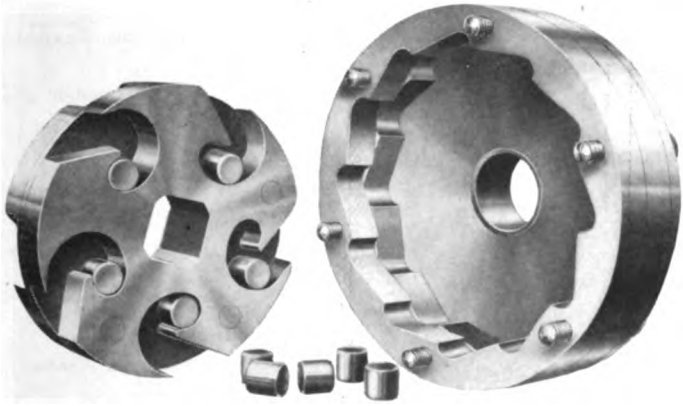

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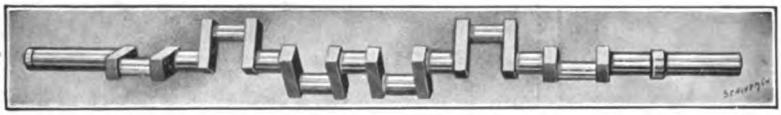

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VULCANIZERS (Continued)

SHOP VULCANIZERS (Continued)

BIGGS Boiler Works Co., Akron, O.

BURGE Machine Works, 218-30 N. Jefferson St., Chicago, Ill. "Excelsior."

COMET Mfg. Co., Flandrau, S. Dak.

DIAMOND Mfg. Co., Des Moines, Ia. "Allen."
(See page 567.)

ELECTRIC Vulcanizer Co., 618 Third Ave. S., Minneapolis, Minn. "Minneapolis."

EXCELSIOR—See Burge Machine Works.

H. & H. Mfg. Co., 511 N. Ninth St., Lafayette, Ind.

HAYWOOD Tire & Equipment Co., Indianapolis, Ind.

HILL-STAGE Co., 604 Jackson St., Anderson, Ind.

MARTIN & Bro., Fred., 161 Bertie St., Pomona, Cal.

MEILI-BLUMBERG Co., New Holstein, Wis.

MILLER, Chas. E., 1400 S. Meridian St., Anderson, Ind.

MILWAUKEE Auto Specialty Co., 705-15 Chestnut St., Milwaukee, Wis. "Radium."
(See page 507.)

MINNEAPOLIS—See Electric Vulcanizer Co.

NATIONAL Motor Supply Co., 5606 Euclid Ave., Cleveland, O.

PROGRESSIVE Mfg. Co., 468 64th Ave. (West Allis), Milwauke, Wis.

RADIUM—See Milwaukee Auto Specialty Co.

SHALER Co., C. A., 903 Fourth St., Waupau, Wis.

VANDERPOOL Co., 723 W. Mulberry St., Springfield, O.

WESTINGHOUSE Electric & Mfg. Co. (E. Pittsburg), Pittsburg, Pa.

WHEELING Stove & Range Co., 86 19th St., Wheeling, W. Va.

WILLIAMS Foundry & Machine Co., Ash St., Akron, O. "Akron-Williams."

WARMERS

FOOT WARMERS

(See Heaters, Automobile)

WASHERS

FELT WASHERS

ADVANCE Felt Specialty Cutting Co. 609 N. La Salle St., Chicago, Ill.

AMERICAN Felt Co., Boston, Mass.

BOOTH, N. E., 642-44 Pacific St., Brooklyn, N. Y.
(See Back Bone.)

BRAUNSDORF, Geo. W., 232-34 E. 43d St., New York, N. Y.

BRAWLEY, T. R., 85-87 Adams St., Brooklyn, N. Y.
(See page 449.)

HOUSE & Sons, Chas. W., Unionville, Conn.
(See page 449.)

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.
(See page 449.)

WESTERN Felt Works, 4115-23 Ogden Ave., Chicago, Ill.

FINISHING WASHERS

AUBURN Machine Works, 290 Auburn Ave., Buffalo, N. Y. "Willard."

KEELER Brass Co., 261-71 Godfrey Ave., Grand Rapids, Mich.

READ Co., A. P., 427-41 W. Randolph St., Chicago, Ill.

STANLEY Works, New Britain, Conn.

WILLARD—See Auburn Machine Works.

IRON AND STEEL WASHERS

AMERICAN Iron & Steel Mfg. Co., Front & Cumberland Sts., Lebanon, Pa.

AVERY Stamping Co., 5209 Lakeside Ave., Cleveland, O.

BETTCHER Mfg. Co., Cleveland, O.

BOSSERT Co., Utica, N. Y.
(See page 233.)

CLARK Bros. Bolt Co., Milldale, Conn.
(See page 89.)

COLUMBUS Bolt Works, 162 W. Randolph St., Columbus, O.

CORBIN Screw Corp., 219 High St., New Britain, Conn.

FALLS Rivet & Machine Co., Kent, O.

GASKET Supply Co., 1729 Ludlow St., Philadelphia, Pa.

HOEFELD & Co., R., Buffalo, N. Y.

IRELAND & Matthews Mfg. Co., 51-79 Iron St., Detroit, Mich.

KANSAS City Bolt & Nut Co. (Sheffield Station), Kansas City, Mo.

McKINNEY Mfg. Co., Pittsburg, N. S., Pa.

NEW England Bolt & Steel Co., Bowdoin St., (Everett), Boston, Mass.

PITTSBURG Screw & Bolt Co., Liberty Ave. & 25th St., Pittsburg, Pa.

PLYMOUTH Mills, Plymouth, Mass.

QUADRIGA Mfg. Co., 119 N. Canal St., Chicago, Ill.

REPUBLIC Iron & Steel Co., Republic Bldg., Youngstown, O.

SESSIONS & Son, J. H., Bristol, Conn.

STANLEY Works, New Britain, Conn.

STEELE & Johnson Mfg. Co., 779 S. Main St., Waterbury, Conn.

UPSON Nut Co., Unionville, Conn.

WROUGHT Washer Mfg. Co., S. Bay & Reynolds Sts., Milwaukee, Wis.

LEATHER WASHERS

ALGCO—See Auburn Leather Goods Co.

AUBURN Leather Goods Co., Auburn, N. Y. "Algco."

BRACE Leather Goods Co., 22 Wayne St., Pontiac, Mich.
(See page 427.)

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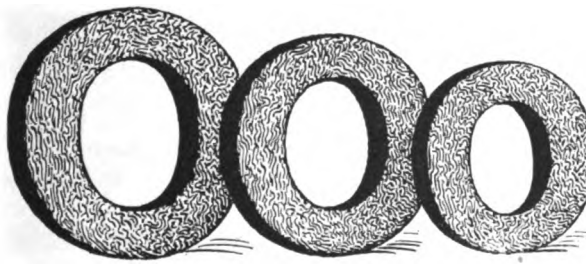

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WASHERS (Continued)

LEATHER WASHERS (Continued)

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DETROIT Leather Specialty Co., 275 Beecher Ave., Detroit, Mich.

DUCKWALL Belting & Hose Co., 516 Capitol Blvd., Indianapolis, Ind.

G & K—See Graton & Knight Mfg. Co.

GRATON & Knight Mfg. Co., Worcester, Mass. "G & K."
(See page 75.)

HOEFELD & Co., R., Buffalo, N. Y.

JUDD & Leland Mfg. Co., Clifton Springs, N. Y.
(See pages 215 and 527.)

SOVEREIGN Co., C. E., 112-20 Court Pl., Rockford, Ill.

SUTHERLAND Co., F. L., 139 Beaubien St., Detroit, Mich.
(See page 449.)

LOCK WASHERS

(See Nuts, Lock)

STEEL SPRING WASHERS

BARNES Co., Wallace, Bristol, Conn.
(See page 673.)

HOBBS Mfg. Co., Worcester, Mass.

VEHICLE WASHERS

ADVANCE Mfg. Co., Franklin, Pa.

BINKS—See Star Brass Works.

BURKE—See Superior Brass Mfg. Co.

CATARACT Auto-Vehicle Washer Co., Topeka, Kans.

CLOOS—See Imperial Valve Co.

CROWN—See King, H. P.

DE LUXE—See F. A. M. Auto Supply Co.

EVERREADY—See Smith Mfg. Co.

F. A. M. Auto Supply Co., 698 Main St., Buffalo, N. Y. "De Luxe."

FEDERAL—See Walworth Mfg. Co.

FISKE Iron Works, J. W., 56-58 Park Pl., New York, N. Y.

GAYLORD Sanitary Mfg. Co., 561 Main St., E., Rochester, N. Y.

IMPERIAL Valve Co., 847 Holton St., Milwaukee, Wis. "Cloos."

IRVING—See Smith Mfg. Co.

KING, H. P., 3112 Lorain Ave., Cleveland, O. "Crown," "Peerless."

L. & M.—See Long Machine Works.

LONG Machine Works, Adam A., Rochester, N. Y. "L. & M."

MULLER, Edward, 1304 John St., East New Durham, N. J.

PEERLESS—See King, H. P.

PEORIA Overhead Vehicle Washer Co., 115 S. Jefferson St., Peoria, Ill.

PERFECT Mfg. Co., Albany, N. Y.

PERFECTION—See Ryan & Long.

RUBBERSET Co., 56 Ferry St., Newark, N. J.

RYAN & Long, 586 Oneida St., Appleton, Wis. "Perfection."

SANITAX Brush Co., 2333 S. Wabash Ave., Chicago, Ill.

SMITH Mfg. Co., I. J., 1007 Ave. Q., Brooklyn, N. Y. "Irving," "Everready."

SMITH & Co., Jos. N., Detroit, Mich.
(See page 93.)

STAR Brass Works, 1909-11 Fulton St., Chicago, Ill. "Binks."

SUPERIOR Brass Mfg. Co., 106 S. Eighth St., St. Louis, Mo. "Burke."

VEHICLE Specialty Mfg. Co., 26 State St., Hartford, Conn.

WALWORTH Mfg. Co., Boston, Mass. "Federal."
(See page 559.)

WESTERN Robe Mills, 43-45 Peck Ct., Chicago, Ill.

WASTE

COTTON WASTE

ARBELLA Waste Co., 1210 Dorchester Ave., Boston, Mass.

BISHOP Mfg. Co., Robert (S. Boston), Boston, Mass.

BLAKELEY & Son, John, 1089 Germantown Ave., Philadelphia, Pa.

BRIGGS & Co., H. A., 242-52 Pine St., Pawtucket, R. I.

EGAN Waste Co., 19 Burling Slip, New York, N. Y.

ESTES Mills, Fall River, Mass.

FIDELITY—See Hagy Waste Works.

FOWLER Waste Mfg. Co., Vineland, N. J.

FULTON Bag & Cotton Mills, Atlanta, Ga.

HAGY & Son, Clayton L., 16th & Carpenter Sts., Philadelphia, Pa.

HAGY Waste Works, J. Milton, 836-42 Swanson St., Philadelphia, Pa. "Fidelity."

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y.

LILLIE Co., Dexter P., Indian Orchard, Mass.

MASSASOIT Mfg. Co., Fall River, Mass.

OLMSTED & Tuttle Co., McKinley Ave., Chicopee, Mass.

RIVERSIDE Mills, Kollock & Bay Sts., Augusta, Ga.

ROWACO—See Royal Waste Co.

ROYAL Mfg. Co., Rahway, N. J.

ROYAL Waste Co., 149 Oliver St., Boston, Mass. "Rowaco."

SNOW DRIFT—See Sweetland Waste Co.

SOUTH Atlantic Waste Co., Charlotte, N. C.

SPRINGFIELD Waste Co., Mill St., Springfield, Mass.

STANDARD Waste Mfg. Co., 2306-10 N. American St., Philadelphia, Pa.

SWEETLAND Waste Co. (S. Boston), Boston, Mass. "Snow Drift."

TRAVERS Twine & Cordage Co., 81 Warren St., New York, N. Y.

UNION Wadding Co., Pawtucket, R. I.

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Seattle .. .. .. 4th Ave. South and Conn. St.
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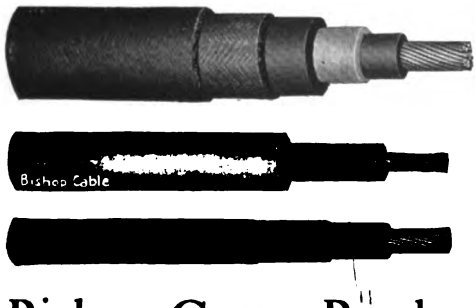
BISHOP IGNITION CABLE positively will outlast any other make on the market. This is due to the way it is made and the material it is made from—new Para rubber so perfectly compounded and vulcanized that it will stand *double* the voltage ever required in service—impregnated with a special compound which makes it positive proof against heat, oil, grease and water—that's why it lasts. In addition to this impregnation of the rubber itself, we coat the Braided Cable with a superior flexible enamel, thoroughly baked on. Every foot is electrically tested before shipment.



TYPE	Diameter Millimeters	Approx. Weightper 1000 Ft.	List Prices per Ft.
A	5	36 lbs.	$0.06
B	6	32 "	.07
C	7	60 "	.12
D	9	98 "	.16
E	10	110 "	.18
F	12	145 "	.25
G	12	132 "	.20
H	15	280 "	.45

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WATCHES

LIMOUSINE WATCHES

NEW England Watch Co., Waterbury, Conn.

WEBBING

JUTE WEBBING

LANDERS Bros. Co., Toledo, O. (See page 107.)

LUDLOW Mfg. Associates, Boston, Mass.

SUSQUEHANNA Webbing Co., Bloomsburg, Pa.

WELDING

AUTOGENOUS WELDING

AIRD Motor Co., 2 Federal St., Troy, N. Y.

AKRON Welding Co., Sweitzer Ave. & Crosier St., Akron, O.

AMERICAN Metal Fusing & Cutting Co., 420-24 Jackson Ave., Long Island City, N. Y.

AMERICAN Welding & Auto Repair Co., 2307 Olive St., St. Louis, Mo.

ATLAS Oxy-Acetylene Welding & Supply Co., 2930 Penn. Ave., Pittsburg, Pa.

ATLAS Welding Works, 2424 Elizabeth Ave., Rahway, N. J.

AUTOGENOUS Welding Equipment Co., 41 Bay St., Springfield, Mass.

BIRMINGHAM Welding & Machinery Co., 118 S. 22d St., Birmingham, Ala.

BOSSERT Co., Utica, N. Y. (See page 233.)

BOURNONVILLE Welding Co., Eug., 241-45 W. 64th St., New York, N. Y.

BROOKLYN Welding Co., 29 York St., Brooklyn, N. Y.

BUSCH-HARTMAN Co., 716 Golden Gate Ave., San Francisco, Cal.

CAPITOL Welding Co., 45-47 Sabin St., Providence, R. I.

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CROSBY Co., Buffalo, N. Y.

DAVIS Sewing Machine Co., Linden & Davis Sts., Dayton, O.

DELCAMPE Welding Co., 1517 Wood Ave., Bridgeport, Conn.

DES MOINES Welding Co., 117-19 Grand Ave., Des Moines, Ia.

DETROIT Welding Specialty Co., 152 Congress St., E., Detroit, Mich.

DYER Apparatus Co., 39 Piedmont St., Boston, Mass. (See page 519.)

ELLINGER Mfg. Co., Walter, 827 Pennsylvania Ave., Sheboygan, Wis.

FUTTERMAN Welding System Co., 302-06 W. 53d St., New York, N. Y.

GERLOFF, Chas. W., 430 Water St., Norfolk, Va.

GREAT Lakes Welding Co., 937-45 West St., Cleveland, O.

HAVENS Bros., Mfg. Co., 1622 Wazee St., Denver, Colo.

HUB Machine, Welding & Contracting Co., 22d & Race Sts., Philadelphia, Pa.

JACOBS Co., F. L., 451 Guoin St., Detroit, Mich.

JOHNSON Welding & Auto Repair Co., 714 S. Wabash Ave., Chicago, Ill.

LAWRENCE & Co., L., 292 Halsey St., Newark, N. J.

METAL Welding & Supply Co., 809-11 Broadway, Denver, Colo.

METALS Welding Co., 4400 Perkins Ave., Cleveland, O.

MICHIGAN Electric Welding Co., 514 Hart Ave., Detroit, Mich. (See page 139.)

NATIONAL Welding & Mfg. Co., 1418-30 Niagara St., Buffalo, N. Y.

OHIO Welding & Mfg. Co., 828-30 W. Sixth St., Cincinnati, O.

OREGON Welding & Mfg. Co., 305 Glisan St., Portland, Ore.

OXY-ACETYLENE Welding Co., 1921 Grand Ave., Kansas City, Mo.

OXY-CARBI Co., New Haven, Conn.

PITTSBURGH Reinforced Brazing & Machine Co., 2525 Liberty Ave., Pittsburg, Pa.

PREST-O-LITE Co., 1400 Speedway, Indianapolis, Ind.

R. I. Welding & Sherardizing Co., Promenade & Park Sts., Providence, R. I.

SANFORD Mfg. Co., F. C., Bridgeport, Conn.

SCHAAP Automobile Co., 344 Cumberland St., Brooklyn, N. Y.

SLOAN Engineering Co., 240-46 Hall St., Brooklyn, N. Y.

SMITH & Co., W. R., 304-06 W. 52d St., New York, N. Y.

SPARKS-WITHINGTON Co., Jackson, Mich. (See page 175.)

STANDARD Welding & Mfg. Co., 951 Main St., Buffalo, N. Y.

STAPLES, Hibbard & Bink, 18 Jefferson Ave., Elizabeth, N. J.

SUPERIOR Welding & Machine Co., Quintard Pl., Stamford, Conn.

TWIN City Welding Co., 313 Seventh Ave., S., Minneapolis, Minn.

VULCAN Brazing & Machine Co., 312 N. 16th St., Philadelphia, Pa.

WATERBURY Welding Co., 1147 South St., Waterbury, Conn. (See page 453.)

WATERHOUSE Welding Co., 6 Pelham St., Boston, Mass.

WESTERN Drop Forge Co., Marion, Ind. (See page 411.)

WESTERN Welding & Mfg. Co., 557 W. Jackson Blvd., Chicago, Ill.

WILKES-BARRE Welding Co., 6 W. Ross St., Wilkes-Barre, Pa.

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 169.)

ELECTRIC WELDING

AKRON-SELLE Co., High & Chestnut Sts., Akron, O.

BILLINGS & Spencer Co., Hartford, Conn.

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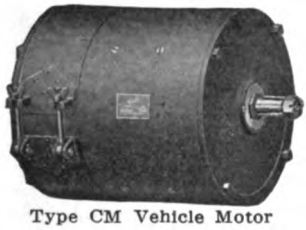
Diehl
TRADE MARK

TYPE C. M. ELECTRIC VEHICLE MOTORS



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4K

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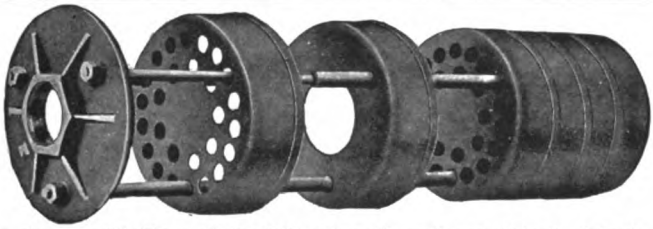

WE manufacture Mufflers of the following diameters: 5 inch, 6 inch and 6¾ inch and we use the number of sections necessary to properly muffle the different size motors that are on the market.

5 inch diameter Mufflers are stamped from 20 gauge steel
6 " " " " " " 18 " "
6¾ " " " " " " 16 or 18 gauge steel.

This muffler is made up of a succession of pressed steel cups drawn from sheet metal. Each cup is shouldered so that it overlaps the bottom of the succeeding one by one-fourth of an inch.

The end plates are malleable iron, with pipe or flange connection.

The perforations are around the outer edge of each baffling plate with an additional one in the center of the first few, the area of these holes varying with the size of the engine to be muffled.

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42 La Fayette Street Utica, N. Y.

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WELDING (Continued)

ELECTRIC WELDING (Continued)

ELECTRIC Welding Products Co., Cleveland, O.
(See page 572.)

JACOBS Co., F. L., 451 Guoin St., Detroit, Mich.

LEWIS Electric Welding & Mfg. Co., Toledo, O.
(See page 443.)

MICHIGAN Electric Welding Co., 514 Hart Ave., Detroit, Mich.
(See page 139.)

SPARKS-WITHINGTON Co., Jackson, Mich.
(See page 175.)

STANDARD Welding Co., Cleveland, O.
(See Book Mark.)

THOMSON Electric Welding Co., 161 Pleasant St., Lynn, Mass.

WORCESTER Pressed Steel Co. (Barbers Crossing), Worcester, Mass.

WHEELS

CAST STEEL WHEELS

DAYTON Steel Foundry Co., Dayton, O.

FRASSE & Co., Peter A., New York, N. Y. (Importers.)
(See page 589.)

JOHNSON Steel Wheel Corp., 30 Kemble St., Boston, Mass.

SHELDON Axle Co., Wilkes-Barre, Pa.
(See page 59.)

WEST Steel Casting Co., 805-13 E. 70th St., Cleveland, O.

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E. C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

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HOUK Co., Geo. W., 5001 Lancaster Ave., Philadelphia, Pa. "Rudge-Whitworth."

HOUK Mfg. Co., Buffalo, N. Y.

MOTT Wheel Works, Utica, N. Y.
(See page 349.)

RUDGE-WHITWORTH—See Houk Co.

SPECIAL PNEUMATIC, SPRING AND EMERGENCY WHEELS

AMERICAN Motor Wheel Co., K. of P. Bldg., Crawfordsville, Ind., "Coats."

AUTOMOBILE Spring Wheel Co., 413 W. Broadway, New York, N. Y. "Sipe."

COATS—See American Motor Wheel Co.

DURGIN Auto Wheel Co., Lawrence National Bank Bldg., Lawrence, Kans. "Modlin."

FROMMANN—See United States Wheel Corp.

IDEAL Steel Wheel Co., 4626-40 Spring Grove Ave., Cincinnati, O.

INDESTRUCTIBLE Wheel Co., 809 E. Walnut St., Lebanon, Ind. "Lofland."

JENKINS Emergency Wheel Co., Mutual Bldg., Richmond, Va.

JOHNSON Steel Wheel Corp., 30 Kemble St., Boston, Mass.

KELSEY Wheel Co., Detroit, Mich.

LEAP Resilient Wheel Co., 2438 Michigan Ave., Chicago, Ill.

LEIB Yielding Wheel Co., 105 McKinley Ave., Middletown, O.

LOFLAND—See Indestructible Wheel Co.

MODLIN—See Durgin Auto Wheel Co.

OSHKOSH—See Pneumatic Hub Wheel Co.

PECK Wheel Co., 4058 Princeton Ave., Chicago, Ill.

PNEUMATIC Hub Wheel Co., Oshkosh, Wis. "Oshkosh."

SCHICK Wheel & Tire Co., 89 Indiana Ave., Wheeling, W. Va.

SEWELL Cushion Wheel Co., Gratiot Ave. & Beaufait St., Detroit, Mich.

SIPE—See Automobile Spring Wheel Co.

SOUTH Bend Spring Wheel Co., South Bend, Ind.

UNITED States Wheel Corp., 910 Michigan Ave., Chicago, Ill. "Frommann."

URIE, W. T., Independence, Mo.

STEERING WHEELS

AMERICAN Wood Rim Co., Onaway, Mich.

AUTO Specialty Co., 2144 Madison Ave., Toledo, O. "Campbell."

BENHAM Mfg. Co., 1882 Mt. Elliott Ave., Detroit, Mich.

CAMPBELL—See Auto Specialty Co.

COLEMAN Mfg. Co., 679-85 Atwater St. E., Detroit, Mich.

METALWOOD Mfg. Co., Leib & Wight Sts., Detroit, Mich.

PERFECTION—See Prosser Engineering Co.

PROSSER Engineering Co., 2106 W. Superior Ave., Cleveland, O. "Perfection."

WIRE WHEELS

CAMERON Wire Wheel Co., 47 Adelaide St., Detroit, Mich.

E.-C. Sales Co., Postal Telegraph Bldg., Chicago, Ill.

HOUK Mfg. Co., Buffalo, N. Y.

KELSEY Wheel Co., Detroit, Mich.

LINDSAY Auto Parts Co., Meridian Life Bldg Indianapolis, Ind.

MOTT Wheel Works, Utica, N. Y.
(See page 349.)

STANDARD Welding Co., Cleveland, O.
(See Book Mark.)

STE-ELASTIC—See Whiteside Wheel Co.

UNIVERSAL Welding Co., St. Anne, Ill.
(See page 455.)

WHITESIDE Wheel Co., Canal & Tenth Sts., Indianapolis, Ind. "Ste-elastic."

Complete Index to Classification appears on Pages 8 to 22.

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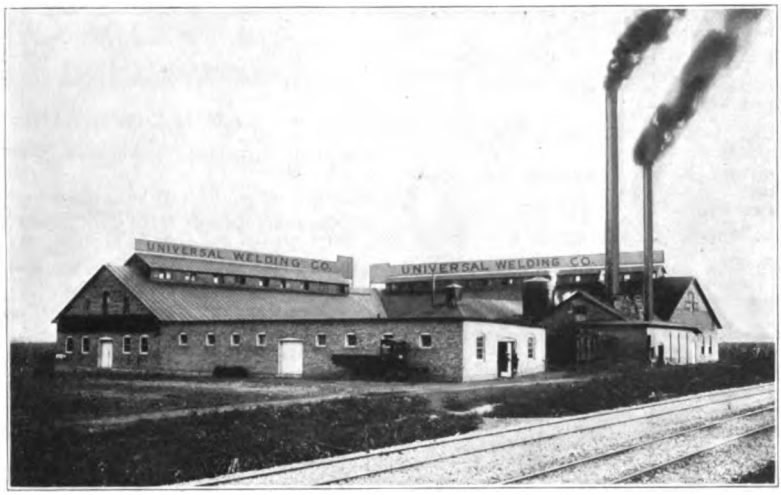

EXCLUSIVELY
WIRE WHEELS and RIMS

Our plant is devoted exclusively to the production of wire wheels and rims.

Our wide reputation as wire wheel and rim specialists coupled with our facilities to make prompt delivery in any quantity makes it to your vital interest to get in touch with us.

Let us figure with you.

Universal Welding Company
ST. ANNE, ILLINOIS

George E. Goble & Company
DETROIT, MICHIGAN
Sole Distributors

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WHEELS (Continued)

WOOD WHEELS

ARCHIBALD Wheel Co., 150 West St., Lawrence, Mass.

AUBURN Wheel & Mfg. Co., Auburn, R. I.

AUTO Wheel Co., Lansing, Mich. (See page 583.)

BALTIMORE Hub-Wheel & Mfg. Co., Harford Ave. & B. & O. R. R., Baltimore, Md.

BIMEL Spoke & Auto Wheel Co., Portland, Ind. (See page 583.)

BUCKEYE Wheel Co., Galion, O.

CENTRAL City Wheel Works, Plum & Willkinson Sts., Syracuse, N. Y.

DEFIANCE—See Turnbull Wagon Co.

EAMES & Co., A. M., South Framingham, Mass.

EBERLY & Orris Mfg. Co., Mechanicsburg, Pa.

EMPIRE Wheel Works, 174 South St., Utica, N. Y.

HARRIS Co., Union St. & Payson Ave., Easthampton, Mass.

HAYES Wheel Co., Jackson, Mich. (See page 457.)

HOOPES Bros. & Darlington, West Chester, Pa.

IMPERIAL-MOTT Department, Flint, Mich. (See page 351.)

IMPERIAL Wheel Co., Richfield Rd., Flint, Mich.

JAMESTOWN Wheel & Mfg. Co., Jamestown, N. Y.

JONES & Co., Phineas, Newark, N. J. (See page 505.)

KELSEY Wheel Co., Detroit, Mich.

MEEKER Mfg. Co., Linden & Hoffman Aves., Dayton, O.

MILLAR Wheel Works, 3518-22 N. Clark St., Chicago, Ill.

PRUDDEN & Co., W. K., Lansing, Mich.

SALISBURY Wheel & Mfg. Co., Jamestown, N. Y. (See page 363.)

SCHWARZ Wheel Co., Margaret St. & Trenton Ave., Philadelphia, Pa.

SHORTSVILLE Wheel Co., Shortsville, N. Y.

STANDARD Wheel Co., Terre Haute, Ind.

TURNBULL Wagon Co., Defiance, O. "Defiance."

WAVERLY Co., 139 S. East St., Indianapolis, Ind.

WAYNE Wheel Co., Newark, N. Y. (See page 505.)

WHEEL & Wood Bending Co., 141 John St., Bridgeport, Conn.

WHIPCORD

UPHOLSTERY WHIPCORD

AMERICAN Mills Co., 17th St. & Fourth Ave., New York, N. Y.

ROY Woolen Co., Watervliet, N. Y.

WATERLOO Woolen Mfg. Co., Waterloo, N. Y.

WHISTLES

EXHAUST WHISTLES

(See Horns, Exhaust)

WICKING

CANDLE WICKING

BISHOP Mfg. Co., Robert (S. Boston), Boston, Mass.

ESTES Mills, Fall River, Mass.

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y.

HOOPER & Sons Co., Wm. E., Maryland Life Bldg., Baltimore, Md.

LEES Mfg. So., 320 Broadway, New York, N. Y.

MASSASOIT Mfg. Co., Fall River, Mass.

WESTPORT Mfg. Co., Fall River, Mass.

FELT LUBRICATOR WICKING

BOOTH, N. E., 642-44 Pacific St., Brooklyn, N. Y. (See Back Bone.)

WICKS

LAMP WICKS

CONSOLIDATED Duck Co., 86 Worth St., New York, N. Y.

HOOPER & Sons Co., Wm. E., Maryland Life Bldg., Baltimore, Md.

LEES Mfg. Co., 320 Broadway, New York, N. Y.

WIPERS

WIPERS AND POLISHING CLOTHS

(For Cotton Waste—See Waste, Cotton)

AMERICAN Mill Ends Co., Detroit, Mich.

ARBELLA Waste Co., 1210 Dorchester Ave., Boston, Mass.

CHICAGO Sanitary Rag Co., 656 W. Austin Ave., Chicago, Ill.

CONSUMERS Paper Co., Detroit, Mich.

DETROIT Sanitary Rag Co., 394 Harper Ave., Detroit, Mich.

DONT-MA—See Hoffman-Corr Mfg. Co.

FULTON Bag & Cotton Mills, Atlanta, Ga.

HAGY Waste Works, J. Milton, 836-42 Swanson St., Philadelphia, Pa.

HOFFMAN-CORR Mfg. Co., 150-52 Duane St., New York, N. Y. "Dont-Ma."

LYMAN Co., John R., Springfield, Mass.

MILL Remnants Co., 80 West St., New York, N. Y.

NORTH & Son, Jos. W., Sixth St., Elizabeth, N. J.

REACH, A. L., 258 Purchase St., Boston, Mass.

ROWACO—See Royal Waste Co.

ROYAL Waste Co., 149 Oliver St., Boston, Mass. "Rowaco."

Complete Index to Classification appears on Pages 8 to 22.

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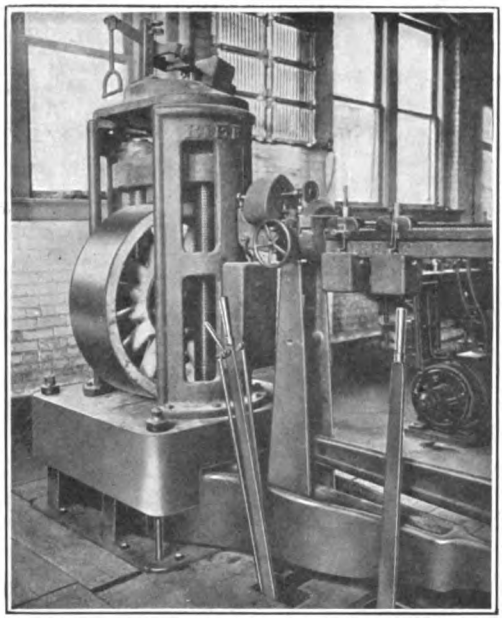
"Quality and Service"

CAN ONLY MEAN

Hayes Wheels

Automobile Engineers "Attention"



"They Stood the Test" Ask Your Engineer

5 TON TRUCK WHEEL
S.A.E. Standard 40"x5" Dual. Tested for Direct Loading. Elastic Limit 140,075 lbs.

Test made under personal supervision of Prof. C. J. Tilden, C. E., of University of Michigan. Write us for further data. Our engineers and designers are at your disposal

It is by means of our efficient corps of timber buyers, choosing and contracting the wood before it is cut; a thoroughly equipped and up-to-date factory, superintended by skilled millwrights of 24 years' experience in the manufacture of wheels; accurate, reliable executive and engineering forces, that we are able to quote you intelligently on any style of pleasure or truck wheels.

Design your car and specify Hayes Wheels. We know that we can aid you in getting the best results, results obtained only by the use of

Hayes Wheels for *"Quality and Service"*

HAYES WHEEL COMPANY, Jackson, Mich.

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WIRE

BOWDEN WIRE

BRETZ Co., J. S., 250 W. 54th St., New York, N. Y. (Importers.)
(See page 589.)

INSULATED WIRE

ACME Rubber Mfg. Co., Trenton, N. J.

AMERICAN Electrical Works, Phillipsdale, R. I.

AMERICAN Steel & Wire Co., 72 W. Adams St., Chicago, Ill.
(See page 451.)

ATLANTIC Insulated Wire & Cable Co., 120 Liberty St., New York, N. Y.

B. I. W.—See Boston Insulated Wire & Cable Co.

BISHOP Gutta-Percha Co., 426 E. 25th St., New York, N. Y.
(See page 451.)

BOSTON Insulated Wire & Cable Co., Boston, Mass. "B. I. W."
(See page 565.)

BOURN Rubber Co., 58 Warren St., Providence, R. I. "Star."

CRESCENT Insulated Wire & Cable Co., Olden Ave. & Taylor St., Trenton, N. J.

DIAMOND Rubber Co., Akron, O.

EAGLE—See Marion Insulated Wire & Rubber Co.

EMPIRE Rubber & Tire Co., Mulberry St. & Clinton Ave., Trenton, N. J.

GENERAL Electric Co., Schenectady, N. Y.

GROSSMAN Mfg. Co., Emil, Bush Terminal, Brooklyn, N. Y. "Red Rib."

HABIRSHAW Wire Co., 1 Madison Ave., New York, N. Y.

HAZARD Mfg. Co., Wilkes-Barre, Pa.

INDIANA Rubber & Insulated Wire Co., Jonesboro, Ind.

KERITE Insulated Wire & Cable Co., 30 Church St., New York, N. Y.

MARION Insulated Wire & Rubber Co., Eighth St., & Big Four Ry., Marion, Ind. "Eagle."

NATIONAL India Rubber Co., Bristol, R. I.

NEW York Insulated Wire Co., 114 Liberty St., New York, N. Y.

OKONITE Co., 253 Broadway, New York, N. Y.

PACKARD Electric Co., Warren, O.

RED RIB—See Grossman Mfg. Co.

ROEBLINGS Sons Co., John A., Trenton, N. J.

SAFETY Insulated Wire & Cable Co., 114 Liberty St., New York, N. Y.

SIMPLEX Wire & Cable Co., 201 Devonshire St., Boston, Mass.

STANDARD Rubber & Cable Co., Bridgeport, Conn.

STANDARD Underground Cable Co., Westinghouse Bldg., Pittsburg, Pa.

STAR—See Bourn Rubber Co.

PHOSPHOR BRONZE WIRE

AMERICAN Brass Co. (Benedict & Burnham Branch), Waterbury, Conn.

PHOSPHOR Bronze Smelting Co., 2200 Washington Ave., Philadelphia, Pa.
(See page 549.)

RIVERSIDE Metal Co., Riverside, N. J.

STEEL SPRING WIRE

AMERICAN Steel & Wire Co., 72 W. Adams St., Chicago, Ill.
(See page 451.)

FRASSE & Co., Peter A., New York, N. Y. (Importers.)
(See page 589.)

HELMUTH Co., L., 17 Battery Pl., New York, N. Y. (Importers.)

MORGAN Spring Co., Worcester, Mass.

NASH Co., Geo., 217 Pearl St., New York, N. Y. (Importers). "Ultra Capital."

ROEBLINGS Sons Co., John A. Trenton, N. J.

SPENCER Wire Co., Worcester, Mass.

TRENTON Iron Co., Trenton, N. J.

ULTRA CAPITAL—See Nash Co.

WOOL

STEEL WOOL

AMERICAN Steel Wool Mfg. Co., 451 Greenwich St., New York, N. Y.

BUEHNE Steel Wool Co., 93 Nassau St., New York, N. Y.

RHODES & Co., J. H., 162 W. Kinzie St., Chicago, Ill.

WRENCHES

VALVE PLUNGER WRENCHES

(For taking Plungers out of Tire Valves)

CODMAN & Shurtleff, 120 Boylston St., Boston, Mass.

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Machinery, Tools, Shop Equipment and Supplies

PART III

Classified Lists of the Manufacturers of Machinery and Tools, and of Factory, Garage, Repair Shop and Foundry Equipment and Supplies

A complete index to classifications appears on pages 8 to 22

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PENN SPRINGS

STRENGTH ELASTICITY

Penn Springs undergo tests which prove their strength and resiliency.

In these tests pressure is applied until the natural bow of the spring is almost reversed. This shows strength. Then the spring must return to its exact original shape. This shows resiliency.

These results come from our scientific treatment of the steel combined with skilled workmanship.

PENN SPRING WORKS

R. K. DAVIS, Sales Manager

Sales Office
Majestic Bldg., Detroit, Mich.

Factory
Baldwinsville, N. Y.

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Part III

MACHINERY, TOOLS, SHOP EQUIPMENT AND SUPPLIES

ANVILS

BLACKSMITHS AND MACHINISTS ANVILS

AMERICAN Wrought Anvil Co., Brooklyn, N. Y.

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

COLUMBIAN Hardware Co., Cleveland, O.

COLUMBUS Forge & Iron Co., Columbus, O. "Trenton."

EAGLE—See Fisher & Norris.

FISHER & Norris, Trenton, N. J. "Eagle."

HAY-BUDDEN Mfg. Co., Brooklyn, N. Y.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

PETER WRIGHT—See Wiebusch & Hilger.

TRENTON—See Columbus Forge & Iron Co.

WIEBUSCH & Hilger, New York, N. Y. (Importers.) "Peter Wright."

BALLS

BURNISHING BALLS

ABBOTT Ball Co., Hartford, Conn.

BARRELS

TUMBLING BARRELS

ABBOTT Ball Co., Hartford, Conn.

BAIRD Machine Co., Bridgeport, Conn.

BARNETT Foundry Co., Oscar, Irvington, N. J.

BYRAM & Co., Detroit, Mich.

CALUMET Foundry Equipment Co., Harvey, Ill.

GILMOUR, J., New York, N. Y.

GLOBE Machine & Stamping Co., 1250 W. 76th St., Cleveland, O. (See page 91.)

HENDERSON Bros., Waterbury, Conn.

McCORMICK Co., J. S., Pittsburg, Pa.

NORTHERN Engineering Works, Detroit, Mich.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 521.)

PERKINS Co., Henry, Bridgewater, Mass.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

SLY Mfg. Co., W. W., Cleveland, O.

WHITING Foundry Equipment Co., Harvey, Ill.

BARS

BORING BARS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

CELFOR Tool Co., Buchanan, Mich.

CLOUGH, R. M., Tolland, Conn.

DAVIS Boring Tool Co., St. Louis, Mo.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 489.)

KELLY Reamer Co., Cleveland, O.

KRIEGER Tool & Mfg. Co., Grand Rapids, Wis.

MARVIN & Casler Co., Canastota, N. Y.

O. K. Tool Holder Co., Shelton, Conn.

READY Tool Co., Bridgeport, Conn. "Red-E."

RED-E—See Ready Tool Co.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNIVERSAL Boring Machine Co., Hudson, Mass.

BASKETS

DIPPING BASKETS

SMITH, Edward F., New Haven, Conn.

Complete Index to Classification appears on Pages 8 to 22.

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BEARINGS

OILLESS BEARINGS

ARGUTO Oilless Bearing Co., Philadelphia, Pa.

BELLOWS

HAND BELLOWS

(Blacksmiths and Molders)

BRAND Co., S. H., Chicago, Ill.

CHAMPION—See Paro. E.

CHRISTEN Bellows & Mfg. Co., St. Louis, Mo.

DOBSON, Wm., Canastota, N. Y.

HILL & Griffith Co., Cincinnati, O.

OSBORN Mfg. Co., Cleveland. O.

PARO, E., Chicago, Ill. "Champion."

WOODASON, Thos., Philadelphia, Pa.

BENDERS

ANGLE BENDERS

(Hand Power)

BERTSCH & Co., Cambridge City, Ind.

EXCELSIOR Tool & Machine Co., East St. Louis, Ill. "X L C R."

HINMAN & Co., D. A., Sandwich, Ill.

WALLACE Supply Co., Chicago, Ill.

X L C R—See Excelsior Tool & Machine Co.

BITS

AUGER BITS

BROWN & Co., R. H,. New Haven, Conn. "Clark's."

CHESTER Mfg. Co., Chester, Conn.

CLARK'S—See Brown & Co.

CONNECTICUT Valley Mfg. Co., Centerbrook, Conn.

DEUSE, J. S., Chester, Conn.

FOREST City Bit & Tool Co., Rockford, Ill.

FORSTNER—See Progressive Mfg. Co.

GREENLEE Bros. & Co., Rockford, Ill.

HUMPHREYSVILLE Mfg. Co., Seymour, Conn.

IRWIN Auger Bit Co., Wilmington, O.

IVES Mfg. Co., W. A., Wallingford, Conn. "Mephisto."

JENNINGS & Co., C. E., New York, N. Y.

KILBORN & Bishop Co., New Haven, Conn. "Lavigne."

LAVIGNE—See Kilborn & Bishop Co.

MEPHISTO—See Ives Mfg. Co.

OHIO Tool Co., Columbus, O.

PROGRESSIVE Mfg. Co., Torrington, Conn. "Forstner."

RUSSELL-JENNINGS Mfg. Co., Chester, Conn.

SNELL Mfg. Co., Fiskdale, Mass.

SWAN Co., Jas., Seymour, Conn.

BLADES

HACK SAW BLADES

(For Hack Saw Frames—See Frames, Hack Saw)

A. A. A.—See Atkins & Co.

ARROW HEAD—See Jennings & Co.

ATKINS & Co., E. C., Indianapolis, Ind. "A. A. A."

BOSTON Saw & Tool Co., Boston, Mass. "Knoxall," "Champion."

CHAMPION—See Boston Saw & Tool Co.

CHROMOL—See Disston & Sons.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DISSTON & Sons, Henry, Philadelphia, Pa. "Chromol."

EUREKA-YANKEE—See Thompson & Son Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIFFIN Co., G. W., Franklin, N. H.

IRVINGTON Mfg. Co., Irvington, N. J.

JENNINGS & Co., C. E., New York, N. Y. "Arrow Head."

KNOXALL—See Boston Saw & Tool Co.

MASSACHUSETTS Saw Works, Springfield, Mass. "Victor."

MILFORD—See Thompson & Son Co.

MILLERS Falls Co., New York, N. Y. "Star."

OLDHAM & Sons, Joshua, New York, N. Y.

QUALITY Saw & Tool Works, Springfield, Mass.

RACINE Tool & Machine Co., Racine, Wis.

SIMONDS Mfg. Co., Fitchburg, Mass.

STAPF & Co., John B., Dunkirk, N. Y.

STAR—See Millers Falls Co.

STERLING—See Diamond Saw & Stamping Works.

TT.—See Thompson & Son Co.

THOMPSON & Son Co., Henry G., New Haven, Conn. "Milford," "Eureka-Yankee," "XL," "TT."

UNIVERSAL—See West Haven Mfg. Co.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

XL—See Thompson & Son Co.

WEST Haven Mfg. Co., New Haven, Conn. "Universal," "Utility."

BLOCKS

CHAIN BLOCKS

(See Cranes, Portable)

Complete Index to Classification appears on Pages 8 to 22.

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The Reamer The Auto Man Has Been Looking For

The only reamer that will hold on all kinds of garage work.

Pratt & Whitney Adjustable Blade Reamers

You can always keep them to size.

Write for catalogue No. 7 "Small Tools," showing our complete line.

Unexcelled for Design, Simplicity and Ease of Adjustment

1. The eccentrically relieved blades are stronger than others, do not chatter and will produce a smoother hole.
2. The hand, shell and fluted chucking reamers have interchangeable nuts, screws and wrenches.
3. The bottom of a hole can readily be faced.
4. By a simple adjustment of the blades the reamer can easily be set to size without regrinding.

PRATT & WHITNEY CO., Hartford, Conn.

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Philadelphia, 405 N. 21st St.
Cleveland, Rockefeller Bldg.
Detroit, 52 Larned St., W.
Chicago, 12 No. Jefferson St.
St. Louis, 416 North 3d St.
Cincinnati, 336 W. 4th St.

Birmingham, Ala., N. C. Walpole, 2015 First Ave.
San Francisco, Harron, Rickard & McCone.
Los Angeles, Harron, Rickard & McCone
Portland, Ore., Portland Machinery Co.

St. Paul, Minn., Robinson, Cary & Sands Co.
Denver, Colo., Hendrie & Bolthoff Mfg. & Sup. Co.
Spokane, Hallidie Co., Inc.
Seattle, Wash., Hallidie Machinery Co.

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BLOWERS

PRESSURE BLOWERS

ABC—See American Blower Co.

AMERICAN Blower Co., Detroit, Mich. "ABC."

AMERICAN Gas Furnace Co., 24 John St., New York, N. Y. **(See page 217.)**

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief."

CHAMPION Blower & Forge Co., Lancaster, Pa.

CONNERSVILLE Blower Co., Connersville, Ind.

HOYSRADT & Case, Kingston, N. Y.

NATIONAL Blower Works, Milwaukee, Wis.

NEW York Blower Co., Chicago, Ill.

PIQUA Blower Co., Piqua, O.

ROOTS Co., P. H. & F. M., Connersville, Ind.

ROYAL—See Canedy-Otto Mfg. Co.

U. S. Gas Machine Co., Muskegon, Mich.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

WILBRAHAM-GREEN Blower Co., Pottstown, Pa.

BOBS

PLUMB BOBS

ACME—See Millers Falls Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

PECK, Stow & Wilcox Co., Southington, Conn.

READING Hardware Co., Reading, Pa.

STANLEY Rule & Level Co., New Britain, Conn.

STARRETT Co., L. S., Athol, Mass.

BOXES

ANNEALING AND CASE HARDENING BOXES

KNOX Pressed & Welded Steel Co., Pittsburg, Pa.

LEETONIA Boiler Co., Leetonia, O.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NATIONAL Mfg. Co., Pittsburg, Pa.

HOSE BOXES

HALE-CHRISTY Co., Cleveland, O. **(See page 465.)**

MITRE BOXES

ACME—See Millers Falls Co.

AYER—See Marsh Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J. "Dorn's."

DORN'S—See Braunsdorf-Mueller Co.

GOODELL Mfg. Co., Greenfield, Mass. "Greenfield."

GREENFIELD—See Goodell Mfg. Co.

LANGDON—See Marsh Co.

LANGDON—See Millers Falls Co.

MARSH Co., H. C., Rockford, Ill. "Langdon," "Ayer."

MILLERS Falls Co., New York, N. Y. "Langdon," "Acme."

OLMSTED'S Son, L. H., Hasbrouck Heights, N. J.

ROCKFORD Mitre Box Co., Rockford, Ill.

STANLEY Rule & Level Co., New Britain, Conn.

SHEET METAL TOTE BOXES

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

HETTS Co., Detroit, Mich.

KILBOURNE & Jacobs Mfg. Co., Columbus, O.

LYON Metallic Mfg. Co., Aurora, Ill.

OHIO Mfg. Co., Painesville, O. **(See page 465.)**

BRACES

BIT BRACES

AMERICAN—See Turner & Deegan.

BARBER—See Millers Falls Co.

BARBERS—See Turner & Deegan.

FRAY Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

HOLDALL—See Millers Falls Co.

LANCASTER Machine & Knife Works, Lancaster, N. Y.

MAYHEW Co., H. H., Shelburne Falls, Mass.

MILLERS Falls Co., New York, N. Y. "Barber," "Holdall."

PECK, Stow & Wilcox Co., Southington, Conn.

STANLEY Rule & Level Co., New Britain, Conn.

TURNER & Deegan, Bristol, Conn. "American," "Barbers."

BRASS

BRAZING BRASS

AMERICAN Brass Co. (Waterbury Brass Branch), Waterbury, Conn.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. **(See page 329.)**

CRESCENT—See North American Smelting Co.

LISSBERGER & Son, Marks, Long Island City, N. Y.

NORTH American Smelting Co., Philadelphia, Pa. "Crescent."

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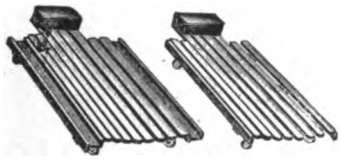
IDEAL

AUTO TRAY



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With or Without Tool Rack

Thirty-seven inches long, 22 inches wide, three inches from floor on four roller bearing malleable iron casters. Has neatly upholstered head rest and rack on each side for tools. Don't roll around in the dirt and grease while working under your car but keep clean and rest yourself. Mission finish.

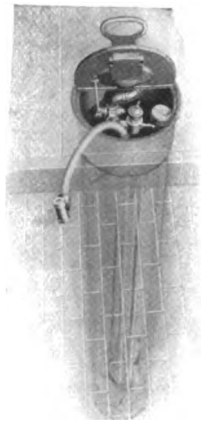
Write for price

Manufactured by the

LEWIS-GEER MFG. CO.,

YPSILANTI, MICH.

HALE CURB BOX



Free Air Distribution at the Curb for Supply Houses Tire Agencies Garages, Clubs Etc., or for Installation in Garage Floors for Accessible Compressed Air and Convenience to Employees.

SIMPLE AUTOMATIC EFFICIENT

Lifting the lid of the hose box automatically opens an air valve allowing the compressed air to enter the hose. A special automatic V-end valve retains the air under pressure in the hose until ready for use. 18 feet of hose may be drawn out, which returns to the box automatically when released.

Write for prices and descriptive bulletin No. 10 A.

Motor Driven Air Compressors, Tanks Etc. Also Mfrs. Agents Automobile Accessories.

THE HALE-CHRISTY CO.
Cleveland, O., U. S. A.

Patented.

Steel Shop Barrels

Stiffest Top Reinforcement Ever Placed on a Barrel

Nothing will take the place of steel barrels for handling large quantities of material. Can attach trunnions for handling with a special truck.

Steel Shop Boxes. All Shapes and Sizes.

Very convenient and economical for handling small parts.

OHIO MFG. COMPANY

Painesville, Ohio

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BROOMS

STEEL WIRE BROOMS

(For cleaning garage floors)

AMERICAN Wire Brush Co., New York, N. Y. "Minerva."

DEAN & Co., Henry E., Worcester, Mass.

MINERVA—See American Wire Brush Co.

OSBORN Mfg. Co., Cleveland, O.

BRUSHES

FOUNDRY AND SHOP BRUSHES

BRAND Co., S. H., Chicago, Ill.

FLINT, Warren F., Boston, Mass.

INDIANAPOLIS Brush & Broom Mfg. Co., Indianapolis, Ind.

MASON Brush Works, Worcester, Mass.

OSBORN Mfg. Co., Cleveland, O.

PAINT AND VARNISH BRUSHES

AERON—See De Vilbiss Mfg. Co.

BOARS HEAD—See Fisher-Mitchell Co.

BRADLEY & Smith, New York, N. Y.

BURTON & Co., A. E., Boston, Mass.

CLINTON & Co., E., Philadelphia, Pa.

DE VILBISS Mfg. Co., Toledo, O. "Aeron."

DEVOE & C. T. Raynolds Co., F. W., New York, N. Y.

ECLIPSE Air Brush & Compressor Co., Newark, N. J.

FISHER-MITCHELL Co., New York, N. Y. "Boars Head."

FRENCH & Co., Samuel H., Philadelphia, Pa.

GERTS, Lumbard & Co., Chicago, Ill.

HANLON & Goodman Co., New York, N. Y.

LEDERER Co., F. J., Buffalo, N. Y. "Presto."

LUCAS & Co., John, Philadelphia, Pa.

MILES Bros. & Co., New York, N. Y.

NIAGARA Devices, 614 Ellicott Sq., Buffalo, N. Y. (See page 521.)

OSBORN Mfg. Co., Cleveland, O.

PACKARD Co., A., Boston, Mass.

PRESTO—See Lederer Co.

RODRIGUEZ, R. E., New York, N. Y.

RUBBERSET Co., Newark, N. J.

THAYER & Co., P. E. Pawtucket, R. I.

THUM, Chas. D., Philadelphia, Pa.

UNITED Brush Manufactories, New York, N. Y.

WHITING-J. J. ADAMS Co., John L., Boston, Mass.

VARNISH BRUSHES

(See Brushes, Paint and Varnish)

BUFFERS

ELECTRIC PORTABLE BUFFERS

(See Drills, Electric Portable)

BULLDOZERS

AJAX Mfg. Co., Cleveland, O.

BLISS Co., E. W., Brooklyn, N. Y.

LONG & Allstatter Co., Hamilton, O.

NILES-BEMENT-POND Co., New York, N. Y

ROCK River Machine Co., Janesville, Wis.

WILLIAMS, White & Co., Moline, Ill.

CALIPERS

CALIPERS AND DIVIDERS

(For Micrometer Calipers—See Micrometers)

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

COLUMBIA—See Smith, E. G.

COPELANDS—See Eagan, Thos. F.

EAGAN, Thos. F., Worcester, Mass. "Copelands."

FAY—See Starrett Co.

GOODELL-PRATT Co., Greenfield, Mass.

JOHNSON, Wm., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

PECK, Stow & Wilcox Co., Southington, Conn.

SMITH, E. G., Columbia, Pa. "Columbia."

STARRETT Co., L. S., Athol, Mass. "Fay," "Yankee."

UNION Caliper Co., Orange, Mass.

YANKEE—See Starrett Co.

CANS

GASOLINE CANS

(For Garage use)

ARROW Can Co., New York, N. Y.

BEMAN Automatic Oil Can Co., Meadville, Pa

CENTRAL Stamping Co., New York, N. Y.

DELPHOS Mfg. Co., Delphos, O.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. (See page 467.)

NATIONAL Enameling & Stamping Co., New York, N. Y.

ROCHESTER Can Co., Rochester, N. Y.

SEXTON Can Co., Boston, Mass.

WALLMAN Mfg. Co., Milwaukee, Wis.

WASTE CANS

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ARROW Can Co., New York, N. Y.

ATLANTIC Stamping Co., Rochester, N. Y.

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CANS (Continued)

WASTE CANS (Continued)

AUTO Metal Co., Springfield, Mass.

CENTRAL Stamping Co., New York, N. Y.

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O.

DELPHOS Mfg. Co., Delphos, O.

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass.
(See page 467.)

DURLACH, I., New York, N. Y.

GEM Stamped Steel Co., Boston, Mass.

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 441.)

LITTLEFORD Bros., Cincinnati, O.

McCLINTOCK & Irvine, Pittsburg, Pa.

NACEFAS—See Wilson & Co.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn.
(See page 547.)

ROCHESTER Can Co., Rochester, N. Y.

WALL Mfg. Supply Co., P., Pittsburg, Pa.

WILSON & Co., F. Cortez, Chicago, Ill. "Nacefas."

CASES

BOLT AND SCREW CASES

AMERICAN Bolt & Screw Case Co., Dayton, O.

CHAPLETS

FOUNDRY CHAPLETS

BURDICK & Son, Albany, N. Y.

CHAMPION Machine & Forging Co., 3725 E. 78th St., Cleveland, O.
(See page 671.)

CLEVELAND Chaplet & Mfg. Co., Cleveland, O.

CRESCENT Brass & Pin Co., Detroit, Mich.

GEM Mfg. Co., Pittsburg, Pa.

HASKINS—See Hill & Griffith Co.

HILL & Griffith Co., Cincinnati, O. "Peerless," "Haskins."

LINDSAY & Co., W. W., Philadelphia, Pa.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 521.)

PEERLESS—See Hill & Griffith Co.

PHILADELPHIA Chaplet & Mfg. Co., Philadelphia, Pa.

SHANAFELT Mfg. Co., Canton, O.

UNITED States Chaplet & Supply Co., New York, N. Y.

CHISELS

CAPE CHISELS

(See Chisels, Cold and Cape)

COLD AND CAPE CHISELS

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BREWER Bros. Co., Philadelphia, Pa.

BUCK Bros., Milbury, Mass.

BUFFUM Tool Co., Louisiana, Mo.

CARVER Tool Works, Spring Valley, N. Y.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CRONK & Carrier Mfg. Co., Elmira, N. Y.

DIAMOND—See Whitman & Barnes Mfg. Co.

DREW & Co., C., Kingston, Mass.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

HARGRAVE—See Cincinnati Tool Co.

HUBBARD & Co., Pittsburg, Pa.

JOHNSON, Wm., Newark, N. J.

K. & B.—See Kilborn & Bishop Co.

KILBORN & Bishop Co., New Haven, Conn "Silex," "K. & B."

KLEIN-LOGAN Co., Pittsburg, Pa.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J

MARCY Tool Works, Putnam, Conn.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo.
(See page 355.)

NOONAN Tool & Machine Co., A. S., Rome N. Y.

OHIO Tool Co., Columbus, O.

PECK, Stow & Wilcox Co., Southington, Conn

S. & I. Co., Springfield, Mass.

SCHUTTE & Co., E. G., Cincinnati, O.

SHARPENEZY—See Smith & Co.

SILEX—See Kilborn & Bishop Co.

SMITH & Co., H. D., Plantsville, Conn. "Sharpenezy."

SNELL Mfg. Co., Fiskdale, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

VAN DOREN Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VERONA Tool Works, Pittsburg, Pa.

VLCHEK Tool Co., Cleveland, O.

WHITE Co., L. & I. J., Buffalo, N. Y.

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

WOODWORKERS CHISELS AND GOUGES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUCK Bros., Milbury, Mass.

GREENLEE Bros. & Co., Rockford, Ill.

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CHISELS (Continued)

WOODWORKERS CHISELS AND GOUGES (Continued)

JENNINGS & Co., C. E., New York, N. Y.
MACK & Co., Rochester, N. Y.
OHIO Tool Co., Columbus, O.
PECK, Stow & Wilcox Co., Southington, Conn.
S. & I. Co., Springfield, Mass.
SWAN Co., Jas., Seymour, Conn.
WHITE Co., L. & I. J., Buffalo, N. Y.
WINSTED Edge Tool Works, Winsted, Conn.

CHUCKS

BORING MILL CHUCKS

GISHOLT Machine Co., Madison, Wis
HORTON & Son Co., E., Windsor Locks, Conn.
UNION Mfg. Co., New Britain, Conn.
WESTCOTT Chuck Co., Oneida, N. Y.

DRILL CHUCKS

ADJUSTABLE Collet Co., Cleveland, O.
ALMOND Mfg. Co., T. R., 1 Maple Ave., Ashburnham, Mass. (See page 437.)
AMERICAN Specialty Co., Chicago, Ill.
AUTOMATIC Drill Chuck Co., New York, N. Y. "Emreck."
BROWN & Co., R. H., New Haven, Conn. "Reid."
BUTLER Chuck Co., Greenfield, Mass.
CELFOR Tool Co., Buchanan, Mich.
CUSHMAN Chuck Co., Hartford, Conn.
DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. "Graham." (See page 489.)
EMRECK—See Automatic Drill Chuck Co.
GOODELL Mfg. Co., Greenfield, Mass. "Greenfield."
GOODELL-PRATT Co., Greenfield, Mass.
GRAHAM—See Detroit Twist Drill Co.
GREENFIELD—See Goodell Mfg. Co.
GRONKVIST Drill Chuck Co., Jersey City, N. J. "Kupke."
HORTON & Son Co., E., Windsor Locks, Conn. "Morrow."
JACOBS Mfg. Co., Hartford, Conn.
KUPKE—See Gronkvist Drill Chuck Co.
LITTLE GIANT—See Westcott Chuck Co.
McCROSKY Reamer Co., Meadville, Pa. "Wizard."
MILLER'S Falls Co., New York, N. Y.
MORROW—See Horton & Son Co.
MORSE Twist Drill & Machine Co., New Bedford, Mass.
NATIONAL—See Oneida National Chuck Co.
NEW BRITAIN—See Union Mfg. Co.
ONEIDA—See Westcott Chuck Co.
ONEIDA National Chuck Co., Oneida, N. Y. "National."
PRATT Chuck Co., Frankfort, N. Y.
PRESTO—See Whitney Mfg. Co.
REID—See Brown & Co.
SKINNER Chuck Co., New Britain, Conn.
STANDARD Tool Co., Cleveland, O.
UNION Mfg. Co., New Britain, Conn. "New Britain."
WEAVER Mfg. Co., Springfield, Ill.
WESTCOTT Chuck Co., Oneida, N. Y. "Little Giant," "Oneida."
WHITNEY Mfg. Co., Hartford, Conn. "Presto." (See page 655.)
WHITON Machine Co., D. E., New London, Conn.
WIARD, F., Detroit, Mich.
WIZARD—See McCrosky Reamer Co.

LATHE CHUCKS

AMERICAN Tool & Machine Co., Boston, Mass. (See page 541.)
CUSHMAN Chuck Co., Hartford, Conn.
HOGGSON & Pettis Mfg. Co., New Haven, Conn. "Sweetland."
HORTON & Son Co., E., Windsor Locks, Conn.
ONEIDA National Chuck Co., Oneida, N. Y.
SKINNER Chuck Co., New Britain, Conn.
SWEETLAND—See Hoggson & Pettis Mfg. Co.
UNION Mfg. Co., New Britain, Conn.
WESTCOTT Chuck Co., Oneida, N. Y.
WHITON Machine Co., D. E., New London, Conn.

MAGNETIC CHUCKS

D. & W. Fuse Co., Providence, R. I.
WALKER & Co., O. S., Worcester, Mass.

MILLING MACHINE CHUCKS

HORTON & Son Co., E., Windsor Locks, Conn.
ONEIDA National Chuck Co., Oneida, N. Y.
SKINNER Chuck Co., New Britain, Conn.
WESTCOTT Chuck Co., Oneida, N. Y.

PLANER CHUCKS

BARTLETT, Edwin E., Boston, Mass.
HORTON & Son Co., E., Windsor Locks, Conn.
JORDAN—See Oneida National Chuck Co.
ONEIDA National Chuck Co., Oneida, N. Y. "Jordan."
SKINNER Chuck Co., New Britain, Conn.
UNION Mfg. Co., New Britain, Conn.

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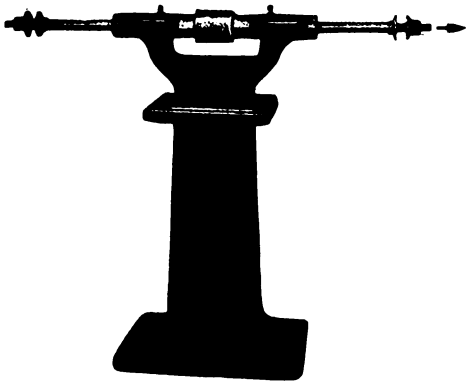

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CHUCKS (Continued)

PNEUMATIC CHUCKS

AEROCHUCK—See Manufacturers Equipment Co.

MANUFACTURERS Equipment Co., 169 N. Jefferson St., Chicago, Ill. "Aerochuck."
(See page 473.)

SCREW MACHINE CHUCKS

HORTON & Son Co., E., Windsor Locks, Conn.

ONEIDA National Chuck Co., Oneida, N. Y.

CLAMPS

MACHINISTS CLAMPS

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVE—See Cincinnati Tool Co.

HOWELL & Murray, Waverly, N. Y.

LE COUNT, Wm. G., S. Norwalk, Conn.

MARK Mfg. Co., Chicago, Ill.

MASSEY Vise Co., Chicago, Ill.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PHOENIX Hardware Co., Buffalo, N. Y.

STARRETT Co., L. S., Athol, Mass.

TAYLOR Mfg. Co., James L., Poughkeepsie, N. Y.

WOODWORKERS CLAMPS

ADVANCE Mfg. Co., Racine, Wis. "Rej-Klamp.
(See page 473.)

ALDRICH Co., Wm. K., Lowell, Mass.

BATAVIA Clamp Co., Batavia, N. Y. "Colts."

BAY STATE—See Cutter, Geo. A.

BLISS Mfg. Co., R., Pawtucket, R. I.

BUFFALO—See Josef Mfg. Co.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

COLTS—See Batavia Clamp Co.

CUTTER, Geo. A., Taunton, Mass. "Bay State."
(See page 559.)

DANN Bros. & Co., New Haven, Conn.

DAYTON Malleable Iron Co., Dayton, O.

DETROIT Screw Works, Detroit, Mich. "Reno."
(See page 661.)

EAGLE—See Woodruff & Sons Co.

EBERHARD Mfg. Co., Cleveland, O.
(See page 237.)

ERIE Stamping & Mfg. Co., Erie, Pa. "Thompson."

GRAND Rapids Hand Screw Co., Grand Rapids, Mich.

HAMMER & Co., Branford, Conn.

HARGRAVE—See Cincinnati Tool Co.

JOSEF Mfg. Co., Chicago, Ill.

MARK Mfg. Co., Chicago, Ill.

MASSEY Vise Co., Chicago, Ill.

MOUNT CARMEL—See Woodruff & Sons Co.

NATIONAL Novelty Corp., New York, N. Y.

OHIO Tool Co., Columbus, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PALMER & Sons, Albert E., Owosso, Mich.

PECK, Stow & Wilcox Co., Southington, Conn.

PHOENIX Hardware Co., Buffalo, N. Y.

REJ-KLAMP—See Advance Mfg. Co.

RENO—See Detroit Screw Works.

SANDUSKY Tool Co., Sandusky, O.

TAYLOR Mfg. Co., James L., Poughkeepsie, N. Y.

THOMPSON—See Erie Stamping & Mfg. Co.

WOODRUFF & Sons Co., Walter W., Mount Carmel, Conn. "Eagle," "Mount Carmel."

CLEANERS

AUTOMOBILE ENGINE CLEANERS

BARNARD Specialty Co., Los Angeles, Cal.

BINKS—See Star Brass Works.

BISHOP-BABCOCK-BECKER Co., Cleveland, O.
(See page 519.)

CHICAGO-RACINE Aluminum, Brass & Iron Works, Chicago, Ill. "Vance."

CLEVELAND Faucet Co., Cleveland, O.

CODMAN & Shurtleff, Boston, Mass.

LENNOX Chemical Co., Cleveland, O.

PROSPECT Mfg. Co., Prospect, O.

RAPID Auto Cleaner Co., Newark, N. J.

ROHRBACHER Automatic Air Pump Co., Portland, Ore.

ROMORT Valve Co., Seattle, Wash.

STAR Brass Works, Chicago, Ill. "Binks."

STEVENS Mfg. & Supply Co., Chicago, Ill.

TURNER Brass Works, Sycamore, Ill.

VANCE—See Chicago-Racine Aluminum Brass & Iron Works.

WAGNER Specialty Co., New York, N. Y.

MINERAL CLEANERS

BENNETT-O'CONNELL Co., Chicago, Ill.

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y.
(See page 507.)

HACHMEISTER-LIND Chemical Co., Pittsburg, Pa.

RHODES & Co., J. H., Chicago, Ill.

CLIPPERS

BOLT AND RIVET CLIPPERS

(Hand Power)

ALLEN-RANDALL—See Porter, H. K.

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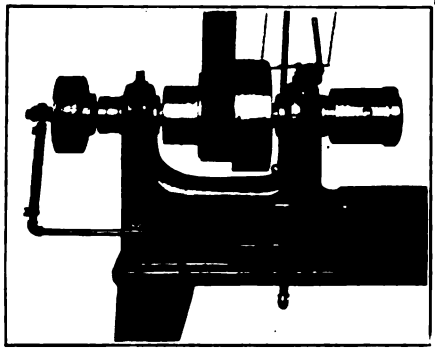

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CLIPPERS (Continued)

BOLT AND RIVET CLIPPERS (Continued)

CAROLUS—See Twin City Specialty Co.

CHAMBERS Bros. Co., Philadelphia, Pa.

COLUMBUS Bolt Works, Columbus, O.

EASY—See Porter, H. K.

ELM CITY—See Schollhorn Co.

HELWIG Mfg. Co., St. Paul, Minn.

METAL Stamping Co., Long Island City, N. Y.

NEW EASY—See Porter, H. K.

PECK, Stow & Wilcox Co., Southington, Conn.

PORTER, H. K., Everett, Mass. "Easy," "New Easy," "Allen-Randall." (See page 475.)

ROBERTS Mfg. Co., Somerville, Mass. "Victor."

SCHOLLHORN Co., Wm., New Haven, Conn. "Elm City."

TWIN City Specialty Co., Sterling, Ill. "Carolus."

VICTOR—See Roberts Mfg. Co.

RIVET CLIPPERS

(See Clippers, Bolt and Rivet)

COLLECTORS

DUST EXHAUST AND COLLECTOR SYSTEMS

ABC—See American Blower Co.

AMERICAN Blower Co., Detroit, Mich. "ABC."

BUFFALO Forge Co., Buffalo, N. Y.

KNICKERBOCKER Co., Jackson, Mich. "Morse-Rarefied."

MORSE-RAREFIED—See Knickerbocker Co.

PANGBORN Corp., Hagerstown, Md.

COMPOUNDS

BRAZING COMPOUNDS

A. & J. Mfg. Co., Chicago, Ill. "Braziron."

ACME—See Universal Fluxine Co.

BANNER—See Cortland Specialty Co.

BRAZIRON—See A. & J. Mfg. Co.

CAST Iron Brazing & Mfg. Co., Manchester, N. H.

CORTLAND Specialty Co., Cortland, N. Y. "Banner."

DIXON Crucible Co., Joseph, Jersey City, N. J. (See page 467.)

FLUXINE—See Krembs & Co.

FRY, Keyser, Reading, Pa.

HALL-THOMPSON Co., Hartford, Conn "Wonder Worker."

KREMBS & Co., Chicago, Ill. "Fluxine."

LAFFITTE—See Phillips-Laffitte Co.

NATIONAL Cement & Rubber Co., Toledo, O

PHILLIPS-LAFITTE Co., Philadelphia, Pa. "Laffitte."

SCHNEIDER, Emil, Newark, N. J.

STANDARD Brazing Co., Boston, Mass "Tichon."

STANDARD Mfg. Co., Chicago, Ill. "Superior."

SUPERIOR—See Standard Mfg. Co.

TICHON—See Standard Brazing Co.

UNIVERSAL Fluxine Co., Urbana, O. "Acme."

WELDWELL—See Westinghouse Electric & Mfg. Co.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa. "Weldwell."

WONDER WORKER—See Hall-Thompson Co

BUFFING AND POLISHING COMPOUNDS

B & L—See Backus & Leeser Co.

BACKUS & Leeser Co., 410-12 W. 13th St., New York, N. Y. "B & L" (See page 547.)

BENNETT-O'CONNELL Co., Chicago, Ill "Mascot."

CROWN—See Geneva Buff & Polish Co.

DETROIT Foundry Supply Co., Detroit, Mich

DIXON, Wm., New York, N. Y.

EBONITE—See Geneva Buff & Polish Co.

GENEVA Buff & Polish Co., Geneva, N. Y. "Crown," "Ebonite."

LYMAN Co., John R., Springfield, Mass.

MASCOT—See Bennett-O'Connell Co.

MATCHLESS Metal Polish Co., New York, N. Y. "White-Diamond."

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. "White Rose," "White Columbia." (See pages 535 and 536.)

WHITE COLUMBIA—See Stevens, Frederic B

WHITE-DIAMOND—See Matchless Metal Polish Co.

WHITE ROSE—See Stevens, Frederic B.

CASE HARDENING COMPOUNDS

ACHILLES—See Houghton & Co.

BLACK DIAMOND—See Rogers & Hubbard Co.

BLAICH, Alfred O., 1956 Clybourn Ave., Chicago, Ill. (See page 475.)

BOHNITE—See Mebane Mfg. Co.

CARBO—See Rodman Chemical Co.

HOUGHTON & Co., E. F., Philadelphia, Pa "Achilles," "Pearlite."

IDEAL Case-Hardening Compound Co., New York, N. Y.

KALUX—See Metal Hardening Solution Co.

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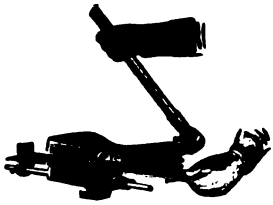

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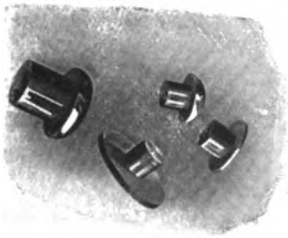

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COMPOUNDS (Continued)

CASE HARDENING COMPOUNDS (Continued)

KEYSTONE—See Rodman Chemical Co.

MEBANE Mfg. Co., Cleveland, O. "Bohnite," "Unicase."

METAL Hardening Solution Co., Rochester, N. Y. "Kalux."

MORRIS & Co., Chicago, Ill.

MOSSO, C. A., Chicago, Ill.

PARK Chemical Co., Detroit, Mich. "Woodsides."

PEARLITE—See Houghton & Co.

PETTINOS Bros., Bethlehem, Pa.

PORTLAND—See Rogers & Hubbard Co.

RODMAN Chemical Co., East Pittsburg, Pa. "Carbo." "Keystone."

ROGERS & Hubbard Co., Middletown, Conn. "Black Diamond," "Standard," "Portland."

STANDARD—See Rogers & Hubbard Co.

STERLINGWORTH Charcoal Co., Boston, Mass.

UNICASE—See Mebane Mfg. Co.

V. D.—See Van Doren Mfg. Co.

VAN Doren Mfg. Co., Chicago Heights, Ill. "V. D."

VINCENT Steel Process Co., Detroit, Mich.

WOODSIDES—See Park Chemical Co.

CORE COMPOUNDS

DETROIT Foundry Supply Co., Detroit, Mich. "Eureka."

EBONY—See Hill & Griffith Co.

EUREKA—See Detroit Foundry Supply Co.

GLUTRIN—See Robeson Process Co.

HILL & Griffith Co., Cincinnati, O. "Ebony," "Linoline."

HOLLAND Linseed Oil Co., Chicago, Ill.

KING KORE KOMPOUND—See Stevens, Frederick B.

LINOLINE—See Hill & Griffith Co.

McCORMICK Co., J. S., Pittsburg, Pa.

MILLS Mfg. Co., H. E., Syracuse, N. Y.

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 521.)

ROBESON Process Co., Au Sable Forks, N. Y. "Glutrin."

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. "King Kore Kompound."
(See pages 535 and 536.)

POLISHING COMPOUNDS

(See Compounds, Buffing and Polishing)

WELDING COMPOUNDS

CORTLAND Welding Compound Co., Cortland, N. Y.

DINGEE, Mont. H., Lynchburg, Va. "Sparger's."

KREMBS & Co., Chicago, Ill. "Weldine."

SPARGER'S—See Dingee, Mont. H.

UNIVERSAL Fluxine Co., Urbana, O.

WELDINE—See Krembs & Co.

COUNTERBORES

AMERICAN Die & Tool Co., Reading, Pa.

CLEVELAND Twist Drill Co., Cleveland, O.
(See pages 487 and 533.)

CLOUGH, R. M., Tolland, Conn.

KENDRICK & Davis Co., Lebanon, N. H.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn.
(See page 463.)

WELLS & Son Co., F. E., Greenfield, Mass.

COUNTERSINKS

AMERICAN Die & Tool Co., Reading, Pa.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRUBAKER & Bros., W. L., Millersburg, Pa.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CLEVELAND Twist Drill Co., Cleveland, O.
(See pages 487 and 533.)

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich.
(See page 489.)

DEUSE, J. S., Chester, Conn.

DIAMOND—See Whitman & Barnes Mfg. Co.

HARGRAVE—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

KENDRICK & Davis Co., Lebanon, N. H.

KILBORN & Bishop Co., New Haven, Conn.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MAYHEW Co., H. H., Shelburne Falls, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn.
(See page 463.)

SNELL Mfg. Co., Fishdale, Mass.

STANDARD Tool Co., Cleveland, O.

STARRETT Co., L. S., Athol, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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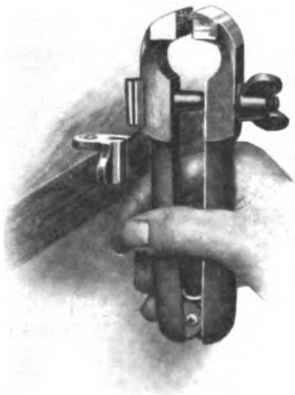

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SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

WELLS & Son Co., F. E., Greenfield, Mass.

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning."
(See page 545.)

CRANES

PORTABLE CRANES, HOISTS AND CHAIN BLOCKS

ACME—See Moore Co.

BEACH Auto Turntable Co., T. C., St. Johns, Mich.

BOSTON & Lockport Block Co., Boston, Mass.

BURR Mfg. Co., Cleveland, O.

CAMERON Engineering Co., Washington, N. J.

CANTON Foundry & Machine Co., Canton, O.
(See page 479.)

CHISHOLM & Moore Mfg. Co., Cleveland, O. "Cyclone."

CYCLONE—See Chisholm & Moore Mfg. Co.

FORD Chain Block & Mfg. Co., Philadelphia, Pa. "Tribloc."

FRANKLIN Portable Crane & Hoist Co., Franklin, Pa.

HARRINGTON Son & Co., Edwin, Philadelphia, Pa. "Peerless."

IMPERIAL—See Ingersoll-Rand Co.

IMPERIAL—See Moore Co.

INGERSOLL-RAND Co., New York, N. Y. "Imperial."
(See page 529.)

LAFAYETTE Engineering Co., Lafayette, Ind.
(See page 479.)

MILTON & Son, S. G., Franklin, Pa.
(See page 479.)

MOORE Co., Franklin, Winsted, Conn "Acme," "Imperial."

NEW Jersey Foundry & Machine Co., New York, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PEERLESS—See Harrington Son & Co.

ROUND & Son, D., Cleveland, O. "Simplex," "Weston."

SIMPLEX—See Round & Son.

SPEIDEL, J. G., Reading, Pa.

STONE, Frank Porter, Chicago, Ill.

TRIBLOC—See Ford Chain Block & Mfg. Co.

UNION Elevator & Machine Co., Chicago, Ill.

WESTON—See Round & Son.

WRIGHT Mfg. Co., Lisbon, O.

YALE & Towne Mfg. Co., 9 E. 40th St., New York, N. Y.
(See page 259.)

CRUCIBLES

METAL MELTING CRUCIBLES

BARTLEY Crucible Co., Jonathan, Trenton, N. J.

BAY State Crucible Co., Taunton, Mass.

BRIDGEPORT Crucible Co., Bridgeport, Conn.

DIXON Crucible Co., Joseph, Jersey City, N. J.
(See page 467.)

GAUTIER & Co., J. H., Jersey City, N. J.

McCULLOUGH-DALZELL Crucible Co., Pittsburg, Pa.

ROSS-TACONY Crucible Co., Philadelphia, Pa.

SEIDEL, R. B., Philadelphia, Pa.

TAUNTON Crucible Co., Taunton, Mass.

CUPOLAS

FOUNDRY CUPOLAS

BYRAM & Co., Detroit, Mich.

CALUMET Foundry Equipment Co., Harvey, Ill.

DETROIT Foundry Supply Co., Detroit, Mich.

McCORMICK Co., J. S., Pittsburg, Pa.

McNEIL & Bro. Co., Jas., Pittsburg, Pa.

NEWTEN—See Northern Engineering Works.

NORTHERN Engineering Works, Detroit, Mich. "Newten."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 521.)

WHITING Foundry Equipment Co., Harvey, Ill.

CUTTERS

BAR CUTTERS

(See Cutters, Rod and Bar)

GASKET CUTTERS

(See Cutters, Washer and Gasket)

MILLING CUTTERS

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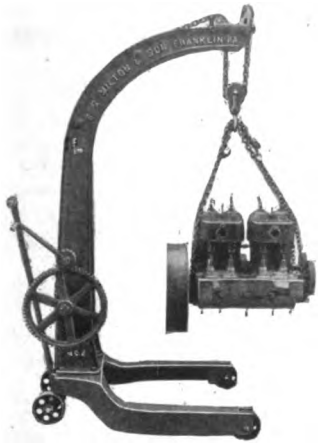

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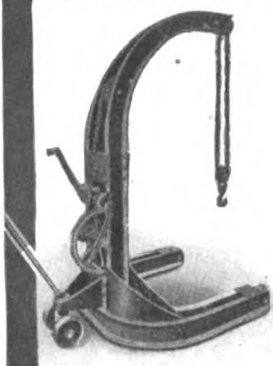

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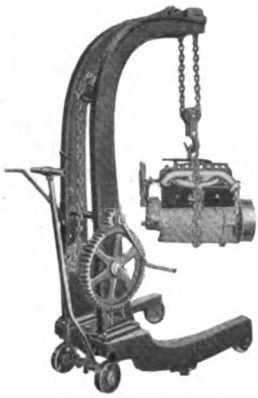

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MILLING CUTTERS (Continued)

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BOKER & Co., Herman, New York, N. Y. (Importers.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

CLEVELAND Twist Drill Co., Cleveland, O.
(See pages 487 and 533.)

CLOUGH, R. M., Tolland, Conn.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich.
(See page 489.)

HUTHER Saw Works, Rochester, N. Y.

ILLINOIS Tool Works, Chicago, Ill.

INGERSOLL Milling Machine Co., Rockford, Ill.

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Tool Co., Cleveland, O.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

PRATT & Whitney Co., Hartford, Conn.
(See page 463.)

S. M. P.—See Screw Machine Products Corp.

SCREW Machine Products Corp., Providence, R. I. "S. M. P."

STANDARD Tool Co., Cleveland, O.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor-Newbold."

TINDEL-MORRIS Co., Eddystone, Pa.

TAYLOR-NEWBOLD—See Tabor Mfg. Co.

UNION Twist Drill Co., Athol, Mass.

UNIVERSAL Boring Machine Co., Hudson, Mass.

WHITNEY Mfg. Co., Hartford, Conn.
(See page 655.)

PIPE CUTTERS

(Hand Power)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

AYES & Co., Chicago, Ill. "Barnes," "Saunders."

BARNES—See Ayes & Co.

BARNES—See Collmer Bros.

BARNES Tool Co., New Haven, Conn.

COLLMER Bros., South Bend, Ind. "Barnes," "Saunders."

ERIE Tool Works, Erie, Pa.

HOLLANDS Mfg. Co., Erie, Pa.

MARK Mfg. Co., Chicago, Ill.

OSWEGO Tool Co., Oswego, N. Y.

REED Mfg. Co., Erie, Pa.

SAUNDERS—See Ayes & Co.

SAUNDERS—See Collmer Bros.

SAUNDERS Sons, D., Yonkers, N. Y.

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., Roxbury, Mass. "Trimo."
(See page 555.)

WELLS & Son Co., F. H., Greenfield, Mass.

ROD AND BAR CUTTERS

(Hand Power)

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill "Marvel."

BELDEN Machine Co., New Haven, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

MARVEL—See Armstrong-Blum Mfg. Co.

MERWIN Mfg. Co., Erie, Pa. "Vulcan."
(See page 475.)

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

VULCAN—See Merwin Mfg. Co.

WALLACE Supply Co., Chicago, Ill.

SPRUE CUTTERS

BARNETT Foundry Co., Oscar, Irvington N. J.

BLISS Co., E. W., Brooklyn, N. Y.

BRASS Founders Supply Co., Newark, N. J.

SHUSTER Co., F. B., New Haven, Conn.

STANDARD Machinery Co., 7 Beverly St., Providence, R. I.
(See page 469.)

STOLL Co., D. H., Buffalo, N. Y.

TOLEDO Machine & Tool Co., Toledo, O.

TURNER Machine Co., Philadelphia, Pa.

WASHER OR GASKET CUTTERS

BONNEY Vise & Tool Works, Allentown, Pa. "Cooper."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

COOPER—See Bonney Vise & Tool Works.

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVE—See Cincinnati Tool Co.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo.
(See page 355.)

ROSE, J. A., Hastings, Neb.

SHAWVER Co., Springfield, O.

SMITH, Otis A., Rockfall, Conn.

STORTZ & Son, John, Philadelphia, Pa.

WOOD FORMING CUTTERS

SHIMER & Sons, Samuel J., Milton, Pa.

DIES

SCREW CUTTING DIES

(See Taps and Dies)

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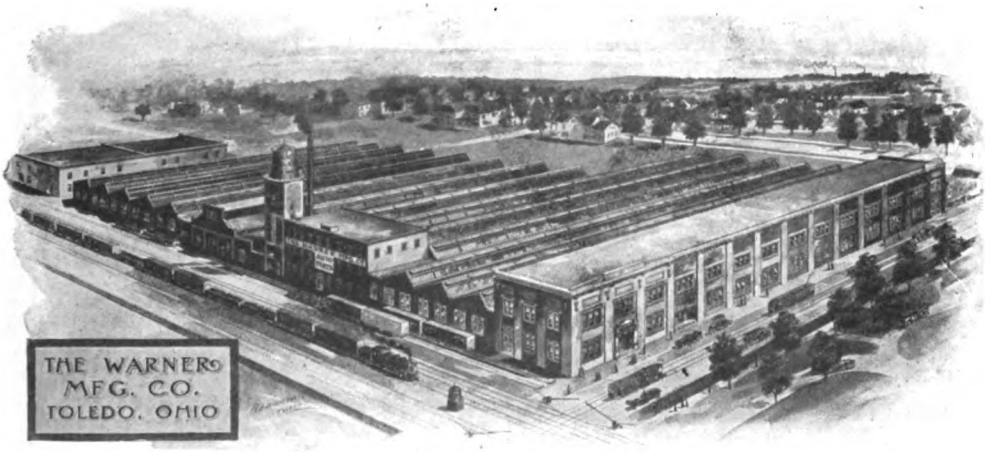

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(See Calipers and Dividers)

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

WELLMAN Pattern-Supply Co., Cleveland, O.

WINKLEY Co., Detroit, Mich. (See page 89.)

DOGS

LATHE DOGS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BESLY & Co., Charles H., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BONNEY Vise & Tool Works, Allentown, Pa. "Indispensable."

COLLMER Bros., South Bend, Ind. "Le Count."

INDESPENSABLE—See Bonney Vise & Tool Works.

LE COUNT—See Collmer Bros.

LE COUNT, Wm. G., South Norwalk, Conn.

MARK Mfg. Co., Chicago, Ill.

NATIONAL—See Oneida National Chuck Co.

O. K. Tool Holder Co., Shelton, Conn.

ONEIDA National Chuck Co., Oneida, N. Y. "National."

OSWEGO Tool Co., Oswego, N. Y.

PHOENIX Hardware Co., Buffalo, N. Y.

READY Tool Co., Bridgeport, Conn. "Red-E."

RED-E—See Ready Tool Co.

STRASBURGER Mfg. Co., Chicago, Ill.

UNION Elevator & Machine Co., Chicago, Ill.

VULCAN—See Williams & Co.

WEST Steel Casting Co., Cleveland, O.

WESTERN Tool & Mfg. Co., Springfield, O.

WILLIAMS & Co., J. H., Brooklyn, N. Y. "Vulcan."

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PATTERN MAKERS DOWELS

BENSKIN Mfg. Co., Canton, O. "Perfect."

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CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

MORSE, Frank W., Boston, Mass.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 521.)

PERFECT—See Benskin Mfg. Co.

DRESSERS

EMERY WHEEL DRESSERS

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

BAY State Stamping Co., Worcester, Mass. "Bennett."

BENNETT—See Bay State Stamping Co.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

CALDER, Geo. H., Lancaster, Pa.

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Screw Co., Homan Ave. & Fillmore St., Chicago, Ill. (See pages 239 and 355.)

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

COLLMER Bros., South Bend, Ind. "Huntington."

COLUMBUS Bolt Works, Columbus, O.

CRAFTS, Arthur A., Boston, Mass.

CROWN—See Clizbe Bros. Mfg. Co.

DESMOND-STEPHAN Mfg. Co., Urbana, O. "Diamo-Carbo," "Sherman," "Huntington."

DETROIT Screw Works, Detroit, Mich. "Huntington." (See page 661.)

DIAMO-CARBO—See Desmond-Stephan Mfg. Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DIAMOND Tool Co., Chicago, Ill.

ERIE Tool Works, Erie, Pa.

HUNTINGTON—See Collmer Bros.

HUNTINGTON—See Desmond-Stephan Mfg. Co.

HUNTINGTON—See Detroit Screw Works.

HUNTINGTON—See Mark Mfg. Co.

MARK Mfg. Co., Chicago, Ill. "Huntington."

NORTH Wales Machine Co., North Wales, Pa.

OSGOOD, J. L., Buffalo, N. Y.

PENINSULA Emery Wheel Co., Detroit, Mich.

QUADRIGA Mfg. Co., Chicago, Ill. "Rearwin."

REARWIN—See Quadriga Mfg. Co.

REED Mfg. Co., Erie, Pa.

SHERMAN—See Desmond-Stephan Mfg. Co.

STANDARD Tool Co., Cleveland, O.

STERLING—See Diamond Saw & Stamping Works.

STERLING Grinding Wheel Co., Tiffin, O.

STRICKLAND, E. M., Detroit, Mich.

VINCENT Steel Process Co., Detroit, Mich.

WRIGLEY Co., Thomas, Chicago, Ill.

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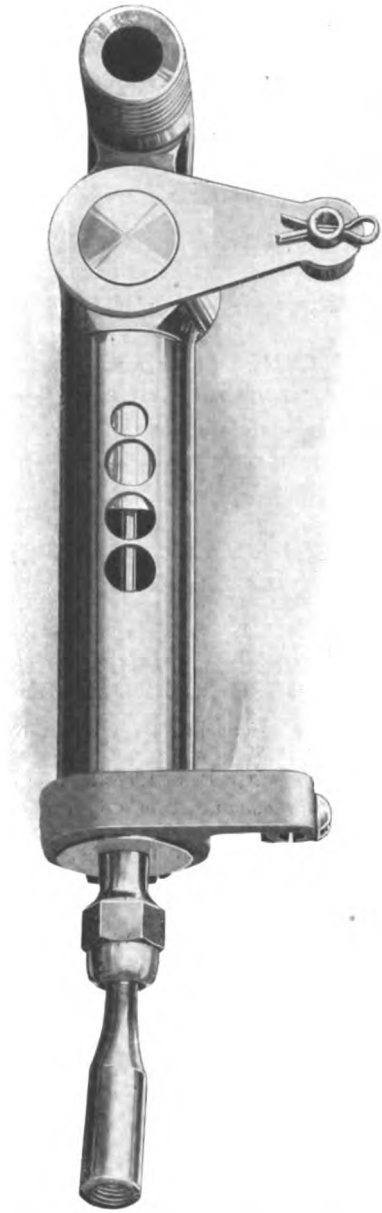

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FRAY Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

LANCASTER Machine & Knife Works, Lancaster, N. Y. "McClellan."

McCLELLAN—See Lancaster Machine & Knife Works.

MALLEABLE Iron Fittings Co., Branford, Conn. "Mifco."
(See page 477.)

MIFCO—See Malleable Iron Fittings Co.

MILLERS Falls Co., New York, N. Y.

NORTH Bros. Mfg. Co., Philadelphia, Pa. "Yankee."

PECK, Stow & Wilcox Co., Southington, Conn.

TURNER & Deegan, Bristol, Conn.

YANKEE—See North Bros. Mfg. Co.

CENTERING DRILLS

CLEVELAND Twist Drill Co., Cleveland, O.
(See pages 487 and 533.)

SLOCOMB Co., J. T., Providence, R. I.

PNEUMATIC DRILLS

(See Tools, Pneumatic)

ELECTRIC PORTABLE DRILLS, GRINDERS AND POLISHERS.

AMERICAN Electric Tool Co., West Newton, Mass. "Carver."

CARVER—See American Electric Tool Co.

CHICAGO Pneumatic Tool Co., Chicago, Ill. "Duntley."

CINCINNATI Electrical Tool Co., Cincinnati, O. "Peerless."

CLARK, Jr., Electric Co., James, Louisville, Ky. "Willey."

COATES Clipper Mfg. Co., Worcester, Mass.

DEER Co., A. J., Hornell, N. Y. "Royal."

DUNTLEY—See Chicago Pneumatic Tool Co.

GEM Mfg. Co., Pittsburg, Pa.

HISEY-WOLF Machine Co., Cincinnati, O.
(See page 487.)

IDEAL—See Smith Electric Tool Co.

PEERLESS—See Cincinnati Electrical Tool Co.

PLANK Flexible Shaft Machine Co., Grand Rapids, Mich.

ROYAL—See Deer Co.

SMITH Electric Tool Co., Cincinnati, O. "Ideal."

STANDARD Electric Tool Co., Cincinnati, O.

STOW Flexible Shaft Co., Philadelphia, Pa.

STOW Mfg. Co., Binghamton, N. Y.

TEMCO Electric Motor Co., Leipsic, O.

UNITED States Electrical Tool Co., Cincinnati, O.
(See page 485.)

VAN DORN Electric Tool Co., Cleveland, O.

WILLEY—See Clark, Jr., Electric Co.

MULTIPLE SPINDLE DRILLING MACHINES

BAUSH Machine Tool Co., Springfield, Mass.

FOOTE-BURT Co., Cleveland, O.

FOX Machine Co., Grand Rapids, Mich.

GARDAM & Son, Wm., New York, N. Y.

MOLINE Tool Co., Moline, Ill.

NATCO—See National Automatic Machine Tool Co.

NATIONAL Automatic Machine Tool Co., Richmond, Ind. "Natco."

PRATT & Whitney Co., Hartford, Conn.
(See page 463.)

SCALLAN & Co., W. E., 1123-25 Gest St., Cincinnati, O.
(See page 555.)

POST DRILLING MACHINES

ADVANCE—See Silver Mfg. Co.

AMERICAN Foundry & Mfg. Co., St. Louis, Mo.

BAUSH Machine Tool Co., Springfield, Mass.

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Western Chief."

CHAMPION Blower & Forge Co., Lancaster, Pa.

GREEN RIVER—See Wiley & Russell Mfg. Co.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

LITTLE GIANT—See Noyes & Co.

NILES-BEMENT-POND Co., New York, N. Y.

NOYES & Co., B. B., Greenfield, Mass. "Little Giant."

SILVER Mfg. Co., Salem, O. "Advance."

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River."
(See page 545.)

RADIAL DRILLING MACHINES

AMERICAN Tool Works Co., Cincinnati, O.

BAUSH Machine Tool Co., Springfield, Mass.

CINCINNATI-BICKFORD Tool Co., Cincinnati, O.

DRESES Machine Tool Co., Cincinnati, O.

FOSDICK Machine Tool Co., Cincinnati, O.

GANG Co., Wm. E., Cincinnati, O.

HILBERT Machine Co., Cincinnati, O.

MORRIS Machine Tool Co., John B., Cincinnati, O.

MUELLER Machine Tool Co., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

REED-PRENTICE Co., Worcester, Mass.

TAYLOR & Finn Co., Hartford, Conn.

WESTERN Machine Tool Works, Holland, Mich.

Complete Index to Classification appears on Pages 8 to 22.

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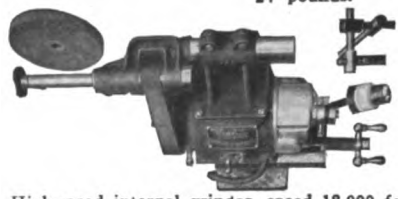
U. S. Electrical TOOLS

¼" drill, weight 9 pounds.

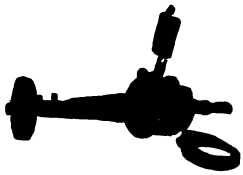
⅜" drill, weight 14 pounds

½" drill in steel, weight 24 pounds.

Made in three sizes, one-horse, two and three-horse.



High-speed internal grinder, speed 18,000 for use on a lathe.



O grinder, for grinding castings.

Type R center grinder.

New York Office 50 Church St., Boston Office, 12 Pearl St., Chicago Office, 8 E. Michigan St.

Works, Cincinnati, Ohio.

The United States Electrical Tool Co.

Write for Complete Catalogue on Portable Tools

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DRILLS (Continued)

RATCHET DRILLS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

ATHA Tool Co., Newark, N. J.

BILLINGS & Spencer Co., Hartford, Conn. "Packer."

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

DIAMOND—See Whitman & Barnes Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

HUNTER Machine Co., Jas., North Adams, Mass.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Monarch," "Weston."

LITTLE GIANT—See Wells Bros. Co.

LOWELL Wrench Co., Worcester, Mass.

MILLERS Falls Co., New York, N. Y.

MONARCH—See Keystone Mfg. Co.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

OSWEGO Tool Co., Oswego, N. Y. "Packer."

PACKER—See Billings & Spencer Co.

PACKER—See Oswego Tool Co.

PANCOAST Co., Henry B., Philadelphia, Pa. "Smith's."

PARKER Co., Charles, Meriden, Conn.

PECK, Stow & Wilcox Co., Southington, Conn.

PRATT & Whitney Co., Hartford, Conn. "Renshaw." (See page 463.)

RENSHAW—See Pratt & Whitney Co.

SMITH'S—See Pancoast Co.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

WESTON—See Keystone Mfg. Co.

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

SENSITIVE DRILLING MACHINES

AVEY—See Cincinnati Pulley Machinery Co.

BURKE Machine Tool Co., Conneaut, O.

CINCINNATI Pulley Machinery Co., Cincinnati, O. "Avey."

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

FOX Machine Co., Grand Rapids, Mich.

GARDAM & Son, Wm., New York, N. Y.

HAMILTON Machine Tool Co., Hamilton, O.

HENRY & Wright Mfg. Co., Hartford, Conn.

HOYSRADT & Case, Kingston, N. Y.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

LELAND & Co., W. H., Worcester, Mass.

MECHANICS Machine Co., Rockford, Ill.

NATIONAL Machine Co., Hartford, Conn.

NORTH Wales Machine Co., North Wales, Pa.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

REED Co., Francis, Worcester, Mass.

REED-PRENTICE Co., Worcester, Mass.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

ROCKWELL—See Ryerson & Son.

RYERSON & Son, Joseph T., Chicago, Ill. "Rockwell."

SLOAN & Chace Mfg. Co., Newark, N. J.

STAPF & Co., John B., Dunkirk, N. Y.

VILLINGER Mfg. Co., Williamsport, Pa. "Williamsport."

WASHBURN Shops, Worcester, Mass.

WILLIAMSPORT—See Villinger Mfg. Co.

TURRET DRILLING MACHINES

NATIONAL Separator & Machine Co., Boston, Mass.

QUINT, A. D., Hartford, Conn.

TURNER Machine Co., Danbury, Conn.

TWIST DRILLS

ACME Drill Co., Newark, N. J.

CELFOR Tool Co., Buchanan, Mich.

CLEVELAND Twist Drill Co., Cleveland, O. "Paragon." (See pages 487 and 533.)

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 489.)

DIAMOND—See Whitman & Barnes Mfg. Co

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

NEW Process Twist Drill Co., Taunton, Mass.

NORKA—See Whitman & Barnes Mfg. Co.

PARAGON—See Cleveland Twist Drill Co.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

RICH Tool Co., Chicago, Ill.

STANDARD Tool Co., Cleveland, O.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

UNION Twist Drill Co., Athol, Mass.

WHITMAN & Barnes Mfg. Co., Akron, O. "Norka," "Diamond."

UPRIGHT DRILLING MACHINES

AURORA Tool Works, Aurora, Ind.

BAKER Bros., Toledo, O.

BARNES Co., W. F. & John, Rockford, Ill.

BARNES Drill Co., Rockford, Ill.

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New Haven Machine Screw Co.

NEW HAVEN, CONN.

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New York CLEVELAND Chicago

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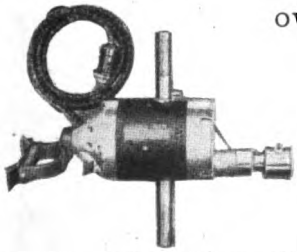
Portable Electric Machine Tools

Pioneer Manufacturers. 12 Years' Experience in Exclusive Manufacture of Electric Machine Tools.

Write for Bulletin Catalog No. 10 and Price List.



Portable Drills 3/16" to ¾" capacity. Direct or alternating or "Universal." Bulletin 102.

OVER 50 DIFFERENT TYPES

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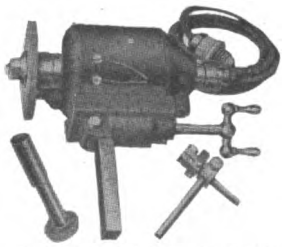
CHICAGO NEW YORK

Agencies in All Principal Cities



Tool Post Grinders for Lathes, etc., ¼ to 1 H. P.; A. C. and D. C. Bulletin 1101.

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DRILLS (Continued)

UPRIGHT DRILLING MACHINES (Continued)

BARR, H. G., Worcester, Mass.

CINCINNATI-BICKFORD Tool Co., Cincinnati, O.

COLBURN Machine Tool Co., Franklin, Pa.

DAVIS Machine Co., W. P., Rochester, N. Y.

FRONTIER Iron Works, Buffalo, N. Y.

HAMILTON Machine Tool Co., Hamilton, O.

HILBERT Machine Co., Cincinnati, O.

HOEFER Mfg. Co., Freeport, Ill.

KERN Machine Tool Co., Hamilton, O.

KNIGHT Machinery Co., W. B., St. Louis, Mo.

MECHANICS Machine Co., Rockford, Ill.

MOLINE Tool Co., Moline, Ill.

NILES-BEMENT-POND Co., New York, N. Y.

REED-PRENTICE Co., Worcester, Mass.

ROCKFORD Drilling Machine Co., Rockford, Ill.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

SIBLEY Machine Tool Co., South Bend, Ind.

SNYDER & Son, J. E., Worcester, Mass.

SUPERIOR Machine Tool Co., Kokomo, Ind.

TAYLOR & Fenn Co., Hartford, Conn.

TSCHUDI-McBARRON Machine Co., Dayton, O.

DRIVERS

SCREW DRIVERS

AUTODRIVER—See Bridgeport Hardware Mfg. Corp.

BILLINGS & Spencer Co., Hartford, Conn.

BISMARCH—See Bridgeport Hardware Mfg. Corp.

BLACKSTONE—See Bridgeport Hardware Mfg. Corp.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J. "New Century," "O. K.," "Ideal."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn. "Autodriver," "Gripshank," "Perfecto," "Blackstone," "Challenge," "Warwick," "Bismarch," "Hercules," "Lead-All," "Matchless."

BROWN & Co., R. H., New Haven, Conn. "Clark's."

BUFFUM Tool Co., Louisiana, Mo.

CASSADY-FAIRBANK Mfg. Co., Chicago, Ill.

CHALLENGE—See Bridgeport Hardware Mfg. Corp.

CHAMPION—See Union Hardware Co.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CLARK'S—See Brown & Co.

CRONK & Carrier Mfg. Co., Elmira, N. Y. "Elmira." "Star."

DICKE Tool Co., Downers Grove, Ill.

DIKEMAN Mfg. Co., Norwalk, Conn.

DISSTON Sons, Henry, Philadelphia, Pa.

ELMIRA—See Cronk & Carrier Mfg. Co.

ELMORE Tool Mfg. Co., Hartford, Conn. "Star," "Hartford."

ERIE Specialty Co., Erie, Pa. "Walker."

ERIE Stamping & Mfg. Co., Erie, Pa. "Esco."

ESCO—See Erie Stamping & Mfg. Co.

GAY, Geo. E., Augusta, Me.

GIANT—See Tuck Mfg. Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIPSHANK—See Bridgeport Hardware Mfg. Corp.

HALL Co., Chas E., Buffalo, N. Y.

HARGRAVE—See Cincinnati Tool Co.

HARTFORD—See Elmore Tool Mfg. Co.

HERBRAND Co., Fremont, O.

HERCULES—See Tuck Mfg. Co.

HERCULES—See Bridgeport Hardware Mfg. Corp.

IDEAL—See Braunsdorf-Mueller Co.

IRVINGTON Mfg. Co., Irvington, N. J.

IVES Mfg. Co., W. A., Wallingford, Conn. "Mephisto."

JOHNSON, Wm., Newark. N. J.

LEAD-ALL—See Bridgeport Hardware Mfg Corp.

LIPSCOMB—See Ellis Co.

MARBLE Arms & Mfg. Co., Gladstone, Mich.

MATCHLESS—See Bridgeport Hardware Mfg. Corp.

MAYHEW Co., H. H., Shelburne Falls, Mass. "Monarch," "Peerless."

MEPHISTO—See Ives Mfg. Co.

MONARCH—See Mayhew Co.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 355.)

NEVER BREAK—See S. & I. Co.

NEW CENTURY—See Braunsdorf-Mueller Co.

NORTH Bros. Mfg. Co., Philadelphia. Pa. "Yankee."

O. K.—See Braunsdorf-Mueller Co.

OHIO Tool Co., Columbus, O.

PEERLESS—See Mayhew Co.

PERFECT HANDLE—See Smith & Co.

PERFECTO—See Bridgeport Hardware Mfg. Corp.

RELIABLE—See S. & I. Co.

RIVAL—See S. & I. Co.

S. & I. Co., Springfield, Mass. "Never Break," "Reliable," "Rival."

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

SNELL Mfg. Co., Fishdale, Mass.

STANLEY Rule & Level Co., New Britain, Conn.

STAR—See Cronk & Carrier Mfg. Co.

STAR—See Elmore Tool Mfg. Co.

STARRETT Co., L. S., Athol, Mass.

Complete Index to Classification appears on Pages 3 to 22.

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Look for it

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REAMERS, CUTTERS, SPECIAL TOOLS, ETC.

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Socket Wrenches
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Tire and Rim Wrenches

RATCHET
Socket Wrench Sets

Special **FORD** Wrenches

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69 Beacon St.

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DRIVERS (Continued)

SCREW DRIVERS (Continued)

STORTZ & Son, John, Philadelphia, Pa.

SWAN Co., Jas., Seymour, Conn.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass. "Hercules," "Giant."

TURNER & Deegan, Bristol, Conn.

UNION Hardware Co., Torrington, Conn. "Champion," "Valley."

VALLEY—See Union Hardware Co.

VLCHEK Tool Co., Cleveland, O.

WALKER—See Erie Specialty Co.

WARWICK—See Bridgeport Hardware Mfg. Corp.

WRIGHT Wrench & Forging Co., Canton, O.

YANKEE—See North Bros. Mfg. Co.

DRYERS

SAND DRYERS

PANGBORN Corp., Hagerstown, Md.

ELEVATORS

GARAGE ELEVATORS

BRODESSER Mfg. Co., Milwaukee, Wis.

COHOES Iron Foundry & Machine Co., Cohoes, N. Y.

EATON & Prince Co., Chicago, Ill.

HAUGHTON Elevator & Machine Co., Toledo, O.

KIECKHEFER Elevator Co., A., Milwaukee, Wis.

McLAUTHLIN Co., Geo. T., Boston, Mass.

OTIS Elevator Co., New York, N. Y.

REEDY Co., H. J., Cincinnati, O.

REEDY Elevator Co., Hoboken, N. J.

REEDY Elevator Mfg. Co., J. W., Chicago, Ill.

SEDGWICK Machine Works, New York, N. Y.

SIDNEY Elevator Mfg. Co., Sidney, O.

STORM Mfg. Co., Newark, N. J.

UNION Elevator & Machine Co., Chicago, Ill.

WARNER Elevator Mfg. Co., Cincinnati, O.

EXPANDERS

BOILER TUBE EXPANDERS

AJAX Mfg. Co., Pittsburg (N. S.), Pa.

FORG, Peter, Somerville, Mass.

EXTINGUISHERS

FIRE EXTINGUISHERS

ACCURATE—See National Metal Stamping & Mfg. Co.

BADGER Chemical Mfg. Co., Milwaukee, Wis. "Mitchell," "Copper King," "Wisconsin."

BENTON—See Chemi Co.

BADGER & Sons Co., E. B., Boston, Mass.

BOYD & Bro., James, Philadelphia, Pa. "Keystone," "Paragon," "Marvello."

CHEMI Co., Richmond, Va. "Benton," "Jupiter."

CHILDS Co., O. J., Utica, N. Y. "Utica."

CHOKE-FIRE—See National Metal Stamping & Mfg. Co.

COPPER KING—See Badger Chemical Mfg. Co.

COSTON Signal Co., New York, N. Y.

DURKEE & Co., Chas. D., 2-3 South St., New York, N. Y. "Reliable." (See page 493.)

ECLIPSE—See Haverhill Fire Appliance Co.

ELECTRENE Co., New York, N. Y.

EMMONS Specialty Co., Detroit, Mich. "Esco."

ESCO—See Emmons Specialty Co.

EVER Ready Mfg. Co., Buffalo, N. Y.

FIRE-FLY—See Northwestern Chemical Co.

FYRO Extinguisher Co., Syracuse, N. Y.

HARRIS Fire Apparatus Co., New York, N. Y.

HAVERHILL Fire Appliance Co., Haverhill, Mass. "Eclipse."

HAYWARD & Co., S. F., New York, N. Y.

HOME Chemical Co., Rochester, N. Y.

INST Lighter Co., Columbus, O.

J-M FYRO—See Johns-Manville Co.

J-M SUCCESS—See Johns-Manville Co.

JOHNS-MANVILLE Co., H. W., New York, N. Y. "Manville," "J-M Success," "J-M Fyro."

JOLIET—See Wilcox Co.

JUPITER—See Chemi Co.

KAHNWEILER'S Sons, David, New York, N. Y. "Simplex."

KEYSTONE—See Boyd & Bro.

LE MAY Mfg. Co., Rochester, N. Y.

LIBERTY Mfg. Association, Chicago, Ill.

LIQUID Carbonic Co., Chicago, Ill.

MANVILLE—See Johns-Manville Co.

MARTEN—See National Metal Stamping & Mfg. Co.

MARVELLO—See Boyd & Bro.

MINIMAX Co., New York, N. Y.

MITCHELL—See Badger Chemical Mfg. Co.

NATIONAL Metal Stamping & Mfg. Co., Newark, N. J. "Accurate," "Marten," "Peerless," "Choke-Fire," "Newark."

NEVERMYSS Fire Extinguisher Co., Middletown, N. Y.

NEWARK—See National Metal Stamping & Mfg. Co.

NORTHWESTERN Chemical Co., Marietta, O. "Fire-Fly." (See pages 143 and 551.)

PARAGON—See Boyd & Bro.

PEERLESS—See National Metal Stamping & Mfg. Co.

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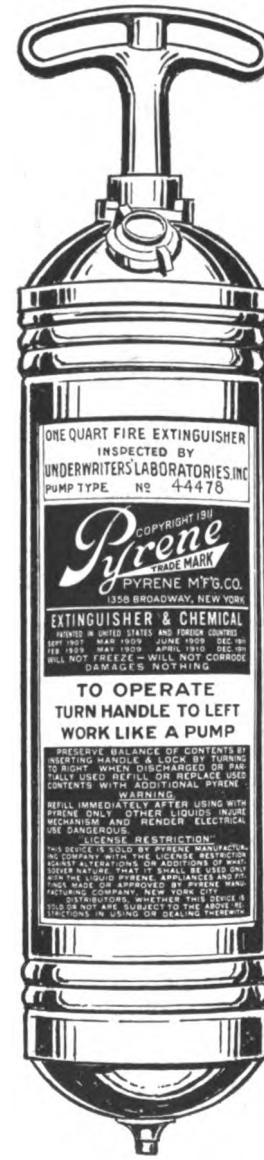
PYRENE REDUCES FIRE INSURANCE COST

Pyrene TRADE MARK FIRE EXTINGUISHER



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Pyrene Vehicle Bracket

PRICES

Steel, Finished in Black Blue and Red Enamel or Galvanized - $0.50

Brass, Lacquered .75

Brass, Nickeled - 1.00

Pyrene Fire Extinguisher

Complete in Bracket

PRICES

Brass Extinguisher with Enameled Bracket $7.50

Brass Extinguisher with Brass Bracket - $7.75

Nickel - Plated Extinguisher with Nickel-Plated Bracket $9.00

Length of Extinguisher, 14 inches; diameter, 3 inches; weight (filled) 5 lbs.

Pyrene Manufacturing Co.

1358 Broadway New York

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FIRE EXTINGUISHERS (Continued)

PHOENIX—See Rex Fire Appliance Co.

PHOENIX Fire Appliance Co., New York, N. Y.

PYRENE Mfg. Co., 1358 Broadway, New York, N. Y.
(See page 491.)

RELIABLE—See Durkee & Co.

REX Fire Appliance Co., New York, N. Y. "Phoenix."

SIMPLEX—See Kalnweiler's Sons.

STEMPEL Fire Extinguisher Co., St. Louis, Mo.

U. S.—See United Mfg. Co.

UNITED Mfg. Co,. Toledo, O. "U. S."

UTICA—See Childs Co.

WILCOX Co., Chas. C., Enid, Okla. "Joliet."

WISCONSIN—See Badger Chemical Mfg. Co.

EXTRACTORS

BROKEN TAP EXTRACTORS

WALTON Co., Hartford, Conn.

FACINGS

FOUNDRY FACINGS AND PARTINGS

BRAND Co., S. H., Chicago, Ill.

BROOKLYN Facing Mills, Brooklyn, N. Y.

CENTRAL Foundry Supply Co., Columbus, O.

DETROIT Foundry Supply Co., Detroit, Mich. "Eureka."

DIXON Crucible Co., Joseph, Jersey City, N. J.
(See page 467.)

DOGGETT, Stanley, New York, N. Y.

EASTERN Facing Mills, Williamsport, Pa.

EUREKA—See Detroit Foundry Supply Co.

FOUNDRY Specialty Co., Cincinnati, O. "Partine."

HILL & Griffith Co., Cincinnati, O.

KELLY & Co., T. P., Hamilton, O

McCORMICK Co., J. S., Pittsburg, Pa.

PARTINE—See Foundry Specialty Co.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa.
(See page 521.)

PETTINOS Bros., Bethlehem, Pa.

SPRINGFIELD Facing Co., Springfield, Mass.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich.
(See pages 535 and 536.)

UNITED STATES Graphite Co., Saginaw, Mich.

FASTENERS

BELT FASTENERS

BLAKES—See Greene, Tweed & Co.

BUFFALO Specialty Co., Buffalo, N. Y.

CRESCENT Belt Fastener Co., New York, N. Y.

GREENE, Tweed & Co., New York, N. Y. "Blakes," "Morans."

JENCKES Mfg. Co., E., Worcester, Mass.

MORANS—See Greene, Tweed & Co.

QUADRIGA Mfg. Co., Chicago, Ill.

SMITH & Co., F. P., Sharon Hill, Pa. "Smithicks."

SMITHICKS—See Smith & Co.

FILES

FILES AND RASPS

AKRON File Co., Akron, O.

AMERICAN—See Nicholson File Co.

AMERICAN Swiss File & Tool Co., New York, N. Y.

ARCADE—See Nicholson File Co.

BARNETT Co., C. & H., Philadelphia, Pa. "Black Diamond."

BETTER-CUT—See Racine File Co.

BLACK DIAMOND—See Barnett Co.

CHATTERTON File Works, Providence, R. I.

CHELSEA File Works, Norwich, Conn.

COLONIAL File Co., Neponset, Mass.

DELTA File Works, Philadelphia, Pa.

DISSTON & Sons, H., Philadelphia, Pa.

EAGLE—See Nicholson File Co.

GEM City File Works Co., Quincy, Ill.

GOLD MEDAL—See Liveright Bros.

GRAVES File Co., Newark, N. J.

GREAT WESTERN—See Nicholson File Co.

GROBET—See Montgomery & Co.

HAYES File Co., Detroit, Mich.

HELLER Bros. Co., Newark, N. J.

J. B. SMITH—See Nicholson File Co.

JOHNSON & Bro., Newark, N. J. "Reliance."

KEARNEY & FOOT—See Nicholson File Co.

LIVERIGHT Bros., Philadelphia, Pa. "Gold Medal."

McCAFFREY File Co., Philadelphia, Pa.

McCLELLAN—See Nicholson File Co.

MADDEN & Morrison File Co., Middletown, N. Y.

MONTGOMERY & Co., 105-07 Fulton St., New York, N. Y. (Importers.) "Grobet."
(See page 495.)

NICHOLSON File Co., Providence, R. I. "American," "Arcade," "Eagle," "XF," "McClellan," "Kearney & Foot," "J. B. Smith," "Great Western."
(See page 493.)

RACINE File Co., Racine, Wis. "Better-cut."

RELIANCE—See Johnson & Bro.

REX File & Saw Co., Newcomerstown, O.

REYNOLDS Bros., Columbus, O.

SIMONDS Mfg. Co., Fitchburg, Mass.

STANDARD Roller Bearing Co., Philadelphia, Pa. "Vixen."

TROJAN—See Troy File Works.

TROY File Works, Troy, N. Y. "Trojan."

VIXEN—See Standard Roller Bearing Co.

WESTPHAL File Co., Milwaukee, Wis.

XF—See Nicholson File Co.

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We hope to see the time

when every manufacturer of motor cars will furnish a Fire Extinguisher as part of the regular car equipment. The loss of a car from a fire, which might easily be extinguished were an efficient apparatus like the RELIABLE FIRE EXTINGUISHER, at hand is inexcusable. For garage or car there is no more efficient, handy means for fighting incipient conflagrations and the price, $6.00 is within any one's means.

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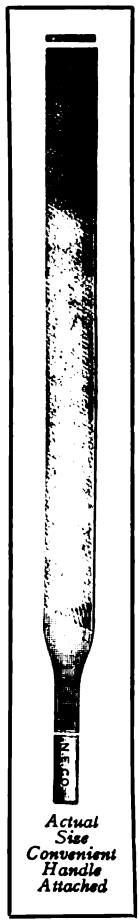
Cut Down Costs!

"Jumpy", irregular running of your engine is often due to corrosion of the contact points.

Nicholson "Coil" Files

Remedy Ignition Troubles



Actual Size Convenient Handle Attached

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[Trade Mark]

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If frequently used the NICHOLSON "Coil" file will save many dollars in a very short time

A necessary addition to your tool-kit.

To introduce these files we will send one dozen postpaid to any part of the United States for $1.50.

Complete File Catalog Sent FREE on request.

Nicholson File Co.
PROVIDENCE, R. I.

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BENSKIN Mfg. Co., Canton, O. "Perfect."

BUTLER, A. G., New York, N. Y.

CLEVELAND Galvanizing Works Co., Cleveland, O.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

PAGE Belting Co., Concord, N. H.

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

WELLMAN Pattern-Supply Co., Cleveland, O.

FLASKS

FOUNDRY FLASKS

ADAMS Co., Dubuque, Ia.

BALDWIN, Tuthill & Bolton, Grand Rapids, Mich.

BARNETT Foundry Co., Oscar, Irvington, N. J.

BRASS Foundries Supply Co., Newark, N. J.

BUCH'S Sons Co., A., Elizabethtown, Pa.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EUREKA—See Smith & Caffrey Co.

HILL & Griffith Co., Cincinnati, O.

OBERMAYER Co., S., Cincinnati, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 521.)

SMITH & Caffrey Co., Syracuse, N. Y. "Eureka."

STERLING Wheelbarrow Co., Milwaukee, Wis.

GRASSELLI Chemical Co., New York, N. Y. "Standard," "Eureka."

HESS & Son, Philadelphia, Pa. "Tinol."

HIKO—See Como Electrical Co.

ILLINOIS Smelting & Refining Co., Chicago, Ill.

INCOMPARABLE—See Reade Mfg. Co.

KALBFLEISCH Co., Franklin H., Broadway & 16th St., New York, N. Y. (See page 595.)

KREMBS & Co., Chicago, Ill.

McGILL Mfg. Co., Valparaiso, Ind. "Crescent," "Star."

NOKORODE—See Dunton Co.

PEERLESS—See Solderall Co.

QUEEN—See Brunner Chemical Works.

READE Mfg. Co., Hoboken, N. J. "Incomparable."

RED LETTER—See Ruby Chemical Co.

RUBY Chemical Co., Columbus, O. "Red Letter."

SAMPSON—See Allen Co.

SCHNEIDER, Emil, Newark, N. J.

SOLDERALL Co., New York, N. Y. "Peerless."

STANDARD—See Grasselli Chemical Co.

STAR—See McGill Mfg. Co.

SUN—See Allen Co.

TINOL—See Hess & Son.

UNIVERSAL Fluxine Co., Urbana, O.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

YAGERS—See Benson Co.

WELDING FLUX

(See Compounds, Welding)

FLUX

BRAZING FLUX

(See Compounds, Brazing)

SOLDERING FLUX

ALLEN Co., L. B., Chicago, Ill. "Sun," "Sampson."

BARCY-NICHOLSON Co., Detroit, Mich.

BENSON Co., Alex. R., Hudson, N. Y. "Yagers."

BLAKE Signal & Mfg. Co., Boston, Mass.

BRUNNER Chemical Works, Cincinnati, O. "Queen."

BURNLEY Battery & Mfg. Co., North East, Pa.

CALLAHAN & Co., Geo., New York, N. Y.

COMO Electrical Co., Spring Lake, N. J. "Hiko."

CRESCENT—See McGill Mfg. Co.

DIELECTRIC Mfg. Co., St. Louis, Mo.

DUNTON Co., M. W., Providence, R. I. "Nokorode."

ELLIOTT Chemical Works, Newton, Mass.

EUREKA—See Grasselli Chemical Co.

FORGES

BLACKSMITHS FORGES

BILLINGS & Spencer Co., Hartford, Conn.

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill. "Royal," "Western Chief," "Challenge," "Hero," "Leader."

CANTON Foundry & Machine Co., Canton, O. (See page 479.)

CHALLENGE—See Canedy-Otto Mfg. Co.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLEVELAND Steam Gauge Co., Cleveland, O. "Watsons."

HERO—See Canedy-Otto Mfg. Co.

LEADER—See Canedy-Otto Mfg. Co.

ROYAL—See Canedy-Otto Mfg. Co.

SILVER Mfg. Co., Salem, O.

STURTEVANT Co., B. F., Hyde Park, Mass.

WATSONS—See Cleveland Steam Gauge Co.

WESTERN CHIEF—See Canedy-Otto Mfg. Co.

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WATERBURY, CONNECTICUT

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FRAMES

HACK SAW FRAMES

(For Hack Saw Blades—See Blades, Hack Saw)

ATKINS & Co., E. C., Indianapolis, Ind. "Hoosier," "Indiana."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

CROWN—See Union Hardware Co.

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DIKEMAN Mfg. Co., Norwalk, Conn.

DISSTON & Sons, Henry, Philadelphia, Pa. "Eagle," "Keystone."

EAGLE—See Disston & Sons.

EAGLE—See Union Hardware Co.

GOODELL-PRATT Co., Greenfield, Mass.

GRIFFIN Co., G. W., Franklin, N. H.

HOOSIER—See Atkins & Co.

INDIANA—See Atkins & Co.

IRVINGTON Mfg. Co., Irvington, N. J.

JENNINGS & Co., C. E., New York, N. Y.

KEYSTONE—See Disston & Sons.

MASSACHUSETTS Saw Works, Springfield, Mass. "Victor."

MILLERS Falls Co., New York, N. Y. "Star."

QUALITY Saw & Tool Works, Springfield, Mass.

S. & I. Co., Springfield, Mass.

SIMONDS Mfg. Co., Fitchburg, Mass.

STAR—See Millers Falls Co.

STARRETT Co., L. S., Athol, Mass.

STERLING—See Diamond Saw & Stamping Works.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNION Hardware Co., Torrington, Conn. "Crown," "Eagle."

UNIVERSAL—See West Haven Mfg. Co.

UTILITY—See West Haven Mfg. Co.

VICTOR—See Massachusetts Saw Works.

WEST Haven Mfg. Co., New Haven, Conn. "Utility," "Universal."

FULLERS

FULLERS AND SWAGES

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

EVANSVILLE Tool Works, Evansville, Ind.

FISHER & Norris, Trenton, N. J.

HELLER Bros. Co., Newark, N. J.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

KLEIN-LOGAN Co., Pittsburg, Pa.

LITTLE GIANT—See Noyes & Co.

NOYES & Co., B. B., Greenfield, Mass. "Little Giant."

SWETT Iron Works, A. L., Medina, N. Y.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

FUNNELS

GASOLINE FUNNELS

ATLANTIC Stamping Co., Rochester, N. Y.

BEST, R. L., Bismarck, N. Dak.

CENTRAL Stamping Co., New York, N. Y. "Puritan."

DOVER Stamping & Mfg. Co., 385 Putnam Ave., Cambridge, Mass. "Saval." (See page 467.)

HOAGLIN Mfg. Co., F. L., Waupaca, Wis. "Nospill."

MASON Co., Geo. H., Boston, Mass.

NATIONAL Enameling & Stamping Co., New York, N. Y.

NO-SHAMMY Products Co., Cleveland, O.

NOSPILL—See Hoaglin Mfg. Co.

PURITAN—See Central Stamping Co.

PURITAN—See Sexton Can Co.

SAVAL—See Dover Stamping & Mfg. Co.

SEXTON Can Co., Boston, Mass. "Puritan."

VOGEL & Bros., Wm., Brooklyn, N. Y.

WALLMAN Mfg. Co., Milwaukee, Wis.

WILSON & Co., F. Cortez, Chicago, Ill.

FURNACES

ANNEALING AND CASE HARDENING FURNACES

AMERICAN Gas Furnace Co., 24 John St., New York, N. Y. (See page 217.)

BELLEVUE Furnace Co., Detroit, Mich.

BEST, W. N., New York, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

BUCKEYE—See MacLeod & Co.

CHICAGO Flexible Shaft Co., Chicago, Ill. "Stewart."

FOUNDRY Equipment Co., Buffalo, N. Y.

GANTT—See Witteman Co.

GILBERT & Barker Mfg. Co., New York, N. Y.

HOSKINS Mfg. Co., Detroit, Mich.

MAC LEOD & Co., Walter, Cincinnati, O. "Buckeye."

ROCKWELL Co., W. S., New York, N. Y.

SCOTT, C. U., Davenport, Ia.

STEWART—See Chicago Flexible Shaft Co.

TATE-JONES & Co., Pittsburg, Pa.

WESTMACOTT Gas Furnace Co., Providence, R. I.

BABBITT MELTING FURNACES

AMERICAN Gas Furnace Co., 24 John St., New York, N. Y. (See page 217.)

CHICAGO Flexible Shaft Co., Chicago, Ill.

DAVIS Machine Co., W. P., Rochester, N. Y. "Vesuvius."

ROCKWELL Co., W. S., New York, N. Y.

VESUVIUS—See Davis Machine Co.

WESTMACOTT Gas Furnace Co., Providence, R. I.

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INVESTIGATE THE

Remy Exchange Offer

Now is the time to replace the old ignition system on your car with the new Remy Magneto, the highest development of the best brains engaged in ignition designing. The exchange can be made for little more than repairs now cost you, by taking advantage of the

REMY EXCHANGE PROPOSITION

	List Price	Allowance	Net to you
2-Cylinder Remy Magneto with coil—complete	$46.00	$9.20	$36.80
4-Cylinder Remy Magneto with coil—complete	50.00	10.00	40.00
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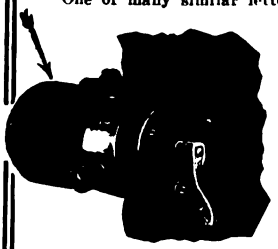
MASTER VIBRATOR FOR FORD CARS

Smallest, neatest and most powerful master vibrator on the market. On Nov. 28, 1913, Mr. G. R. Ide, of East Providence, R. I., wrote:

"I received my master vibrator for my Ford car and it works perfectly great. I never knew the car to run so smoothly as it does now. Have just convinced my next door neighbor that the "Connecticut" was the proper thing for his car and so he put it on and is mighty well pleased with it too."

One of many similar letters.



Quickly installed. Easy starting. Makes a sweet running motor. More light from your lamps. Sold under a guarantee.

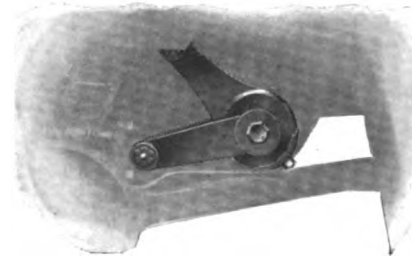
Price, $9.00 delivered

Write for Bulletin No. 38.

Connecticut Tel. and Electric Company, Inc.
Meriden, Conn.

SHOCK ABSORBERS FOR FORD CARS

A Ford car, fitted with these special Ford Absorbers will hold to the road in a way to surprise you, which means
Greater safety
Greater speed without discomfort
Greater Tire Mileage
Greater life of the car



Remember these are genuine shock absorbers as used on the best cars made and are not a cheap device made for Ford cars and misnamed "shock absorbers." They are shock absorbers in every sense of the word.

Price $22.50 per set

Write for Bulletin No. 27.

Connecticut Shock Absorber Co. Inc.
Meriden, Conn.

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FURNACES (Continued)

BRASS AND COPPER MELTING FURNACES

BARNETT Foundry Co., Oscar, Irvington, N. J.

BEST, W. N., New York, N. Y.

BRASS Founders Supply Co., Newark, N. J.

BYRAM & Co., Detroit, Mich.

CALUMET Foundry Equipment Co., Harvey, Ill.

CHICAGO Flexible Shaft Co., Chicago, Ill.

FISHER, Alfred, Chicago, Ill.

FOUNDRY Equipment Co., Buffalo, N. Y.

KROESCHELL Bros. Co., Chicago, Ill. "Kroeschell-Schwartz."

KROESCHELL-SCHWARTZ—See Kroeschell Bros. Co.

LITTLEFORD Bros., Cincinnati, O.

M. R. V.—See Wise, J. B.

MONARCH Engineering & Mfg. Co., Baltimore, Md. "Steele-Harvey."

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 521.)

ROCKWELL Co., W. S., New York, N. Y.

STEELE-HARVEY—See Monarch Engineering & Mfg. Co.

TATE-JONES & Co., Pittsburg, Pa.

WESTMACOTT Gas Furnace Co., Providence, R. I.

WHITING Foundry Equipment Co., Harvey, Ill.

WISE, J. B., Watertown, N. Y. "M. R. V."

GASOLINE FURNACES

(See Torches, Gasoline)

SOLDERING FURNACES

(See also Torches, Gasoline)

DETROIT Heating & Lighting Co., Detroit, Mich.

GAUGES

CENTRE GAUGES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

DEPTH GAUGES

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

STARRETT Co., L. S., Athol, Mass.

DRILL AND WIRE GAUGES

BLODGETT Mfg. Co., Rochester, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 489.)

MORSE Twist Drill & Machine Co., New Bedford, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

STARRETT Co., L. S., Athol, Mass.

LIMIT GAUGES

BROWN & Sharpe Mfg. Co., Providence, R. I.

LITTLE GIANT—See Wells Bros. Co.

NICHOLS, W. H., Waltham, Mass.

PRATT & Whitney Co., Hartford, Conn (See page 463.)

ROGERS Works, John M., Gloucester City, N. J.

SLOAN & Chace Mfg. Co., Newark, N. J.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

PLUG AND RING GAUGES

AMES & Co., B. C., Waltham, Mass.

ATLAS Ball Co., Philadelphia, Pa.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GRONKVIST Drill Chuck Co., Jersey City, N. J. (Importers.) "Johansson."

JOHANSSON—See Gronkvist Drill Chuck Co.

LITTLE GIANT—See Wells Bros. Co.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NICHOLS, W. H., Waltham, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

ROGERS Works, John M., Gloucester City, N. J.

SLOAN & Chace Mfg. Co., Newark, N. J.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

RING GAUGES

(See Gauges, Plug and Ring)

SCREW PITCH GAUGES

AMES & Co., B. C., Waltham, Mass.

ATHOL Machine Co., Athol, Mass.

BLODGETT Mfg. Co., Rochester, N. Y.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

LITTLE GIANT—See Wells Bros. Co.

NICHOLS, W. H., Waltham, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

REED & Prince Mfg. Co., Worcester, Mass.

STARRETT Co., L. S., Athol, Mass.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

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If so, our message is not for you. We want manufacturers of motor cars and trucks to know that VANADIUM BRONZES are as remarkable in toughness, strength and wearing qualities as Vanadium Steels. For gears, for every bearing in the motor and car and for parts subjected to strain and vibration VANADIUM BRONZES will be found superior. Extravagant statements will not convince you but a trial will.

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GAUGES (Continued)

SURFACE GAUGES

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

REMINGTON Tool & Machine Co., Woburn, Mass.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

WIRE GAUGES

(See Gauges, Drill and Wire)

GRINDERS

CHUCKING GRINDERS

BRYANT Chucking Grinder Co., Springfield, Vt.

CRANK PIN GRINDERS

LANDIS Tool Co., Waynesboro, Pa. (See page 501.)

NORTON Grinding Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

TINDEL-ALBRECHT—See Tindel-Morris Co.

TINDEL-MORRIS Co., Eddystone, Pa. "Tindel-Albrecht."

CUTTER GRINDERS

(See Grinders, Reamer and Cutter)

CYLINDER GRINDERS

HEALD Machine Co., Worcester, Mass.

DISC GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BESLY & Co., Charles H., Chicago, Ill.

DIAMOND Machine Co., Providence, R. I.

GARDNER Machine Co., Beloit, Wis.

HOYSRADT & Case, Kingston, N. Y.

RANSOM Mfg. Co., Oshkosh, Wis.

ROWBOTTOM Machine Co., Waterbury, Conn.

TAYLOR & Finn Co., Hartford, Conn.

VALLEY City Machine Works, Grand Rapids, Mich.

DRILL GRINDERS

HEALD Machine Co., Worcester, Mass.

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NEW YANKEE—See Wilmarth & Morman Co.

SELLERS & Co., Wm., Philadelphia, Pa.

WASHBURN Shops, Worcester, Mass. "Worcester."

WILMARTH & Morman Co., Grand Rapids, Mich. "New Yankee."

WORCESTER—See Washburn Shops.

ELECTRIC PORTABLE GRINDERS

(See Drills, Electric Portable)

INTERNAL GRINDERS

BATH Grinder Co., Fitchburg, Mass.

CONOVER-OVERKAMP Machine & Tool Co. Dayton, O.

HEALD Machine Co., Worcester, Mass.

LANDIS Tool Co., Waynesboro, Pa. (See page 501.)

MODERN Tool Co., Erie, Pa.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

RIVETT Lathe & Grinder Co., Boston, Mass.

THOMPSON Grinder Co., Springfield, O.

VAN NORMAN Machine Tool Co., Springfield, Mass.

PISTON RING GRINDERS

ALERT—See Harding, S. B.

BAY State Grinder Co., Worcester, Mass.

HARDING, S. B., Waukesha, Wis. "Alert."

HEALD Machine Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

WALKER Grinder Co., Worcester, Mass.

PLAIN TOOL GRINDERS

ATHOL Machine Co., Athol, Mass.

BAIRD Machine Co., Bridgeport, Conn.

BATH Grinder Co., Fitchburg, Mass.

BLOUNT Co., J. G., Dept. A, Everett, Mass. (See page 471.)

BROWN & Sharpe Mfg. Co., Providence, R. I.

BUILDERS Iron Foundry, Providence, R. I.

CANTON Foundry & Machine Co., Canton, O. (See page 479.)

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Machine Tool Co., Chicago, Ill.

CLIZBE Bros. Mfg. Co., Plymouth, Ind. "Crown."

CROWN—See Clizbe Bros. Mfg. Co.

DIAMOND Machine Co., Providence, R. I.

LA SALLE Machine & Tool Co., La Salle, Ill.

LANDIS Tool Co., Waynesboro, Pa. (See page 501.)

LUTHER Grinder Mfg. Co., Milwaukee, Wis.

MODERN Tool Co., Erie, Pa.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

NORTON Grinding Co., Worcester, Mass.

OESTERLEIN Machine Co., Cincinnati, O.

PARTRIDGE, E. O., Chicago, Ill.

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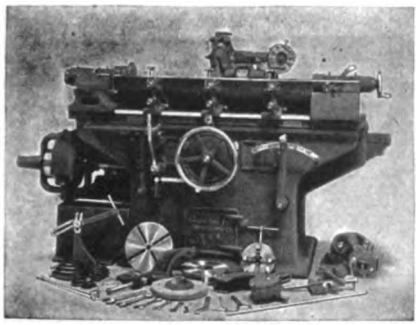
We Can Completely Equip Any Gas Engine or Automobile Grinding Department—Our Line:—

Landis Plain Grinder

Landis Plain Grinding Machines:—For line bearings of crank shafts—cam shaft bearings—valves (straight portion), push rods—pistons—piston rings—transmission shafts—axles, etc.

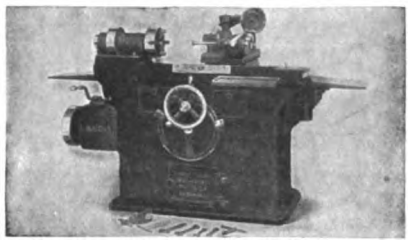
Landis Crank Grinder

Landis Crank Grinding Machine:—Capacity for single and multiple throw crank shafts with throws up to 8" single and 6" multiple.



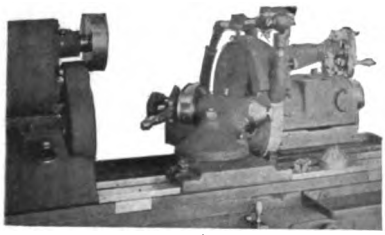
Landis Universal Grinder

Landis Universal Grinding Machines:—For valves (straight and taper portions), magnetos—piston rings (face grind), besides for tools—jigs, bushings, etc. This machine grinds—straight or taper internal or external—and is adapted for use with attachments such as magnetic chuck—valve seat grinding attachment—cam grinding attachment—cutter attachments, etc.

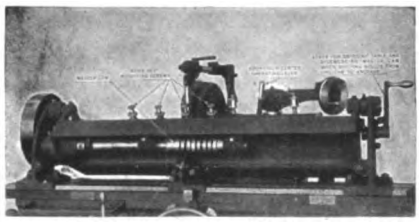


Landis Internal Grinder

Landis Internal Grinding Machine:—Transmission and differential gears—piston pin bushings—can be arranged for use with water—or with quick acting collet chuck.



Valve Seat Attachment:—For valve seats; also any other work of like nature. Graduated for swiveling to 90°.



Landis Cam Grinding Attachment

Landis Cam Grinding Attachments:—For use on Landis Universal and Plain grinding machines, both detachable and integral cam grinding attachments are each built in 3 sizes to suit our machines.

LANDIS TOOL COMPANY, Waynesboro, Pa.

New York Office, Fulton Building, 50 Church Street, Walter H. Foster Company, Managers

AGENTS: Dewstoe Machine Tool Co., Birmingham, Ala. Harron, Rickard & McCone, San Francisco and Los Angeles. C. W. Burton Griffiths & Co., London and Glasgow. Schuchardt & Schutte, Berlin, Stockholm, St. Petersburg, Copenhagen. Alfred H. Schutte, Cologne, Brussels, Liege, Milan, Paris, Barcelona and Bilbao. Donauwerk Ernst Krause & Co., Wien, Prag and Budapest. A. R. Williams Machinery Co., Toronto. Williams & Wilson, Montreal, Canada. Andrews & George, Yokohama, Japan.

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GRINDERS (Continued)

PLAIN TOOL GRINDERS (Continued)

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

RANSOM Mfg. Co., Oshkosh, Wis.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

ST. LOUIS Machine Tool Co., St. Louis, Mo.

STAPF & Co., John B., Dunkirk, N. Y.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor."

TAYLOR—See Tabor Mfg. Co.

VALLEY City Machine Works, Grand Rapids, Mich.

WALKER Grinder Co., Worcester, Mass.

WEBSTER & Perks Tool Co., Springfield, O.

REAMER AND CUTTER GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Milling Machine Co., Cincinnati, O.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

GREENFIELD Machine Co., Greenfield, Mass.

INGERSOLL Milling Machine Co., Rockford, Ill.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

NATIONAL Machine Co., Hartford, Conn.

OESTERLEIN Machine Co., Cincinnati, O.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

THOMPSON Grinder Co., Springfield, O.

WALKER Grinder Co., Worcester, Mass.

WELLS & Son Co., F. E., Greenfield, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

WOODS Engineering Co., Alliance, O.

SURFACE GRINDERS

BATH Grinder Co., Fitchburg, Mass.

BAY State Grinder Co., Worcester, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

DIAMOND Machine Co., Providence, R. I.

GARVIN Machine Co., New York, N. Y.

HEALD Machine Co., Worcester, Mass.

LA SALLE Machine & Tool Co., La Salle, Ill.

LANDIS Tool Co., Waynesboro, Pa. (See page 501.)

NATIONAL Machine Co., Hartford, Conn.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

ROWBOTTOM Machine Co., Waterbury, Conn.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

THOMPSON Grinder Co., Springfield, O.

VALLEY City Machine Works, Grand Rapids, Mich.

WALKER Grinder Co., Worcester, Mass.

WILMARTH & Morman Co., Grand Rapids, Mich.

SWING FRAME GRINDERS

PITTSBURG Emery Wheel Co., Pittsburg, Pa.

SAFETY Emery Wheel Co., Springfield, O.

TUCKER Machine Co., Cincinnati, O.

UNIVERSAL GRINDERS

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Grinder Co., Cincinnati, O.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

LANDIS Tool Co., Waynesboro, Pa. (See page 501.)

MODERN Tool Co., Erie, Pa.

NORTON Grinding Co., Worcester, Mass.

THOMPSON Grinder Co., Springfield, O.

WILMARTH & Marmon Co., Grand Rapids, Mich.

WET TOOL GRINDERS

BLOUNT Co., J. G., Dept. A., Everett, Mass. (See page 471.)

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

CHALLENGE Machine Co., Philadelphia, Pa.

CHICAGO Machine Tool Co., Chicago, Ill.

DIAMOND Machine Co., Providence, R. I.

GISHOLT Machine Co., Madison, Wis.

HOYSRADT & Case, Kingston, N. Y.

LELAND & Co., W. H., Worcester, Mass.

LUTTER & Gies Co., Milwaukee, Wis-. "Milwaukee."

MILWAUKEE—See Lutter & Gies.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

RANSOM Mfg. Co., Oshkosh, Wis.

SELLERS & Co., Wm., Philadelphia, Pa.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

STERLING Grinding Wheel Co., Tiffin, O.

TAYLOR & Finn Co., Hartford, Conn.

TUCKER Machine Co., Cincinnati, O.

VALLEY City Machine Works, Grand Rapids, Mich.

WEBSTER & Perks Tool Co., Springfield, O.

HAMMERS

BRASS AND COPPER HAMMERS

EUREKA Co., North East, Pa. (See page 273.)

GOODELL-PRATT Co., Greenfield, Mass.

GRAHAM & Co., James, 293 Wooster St., New Haven, Conn. (See page 343.)

ROSE, J. A., Hastings, Neb.

UNION Hardware Co., Torrington, Conn.

WELCH Co., Thomas F., Boston, Mass.

Complete Index to Classification appears on Pages 8 to 22.

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HAMMERS (Continued)

CLAW HAMMERS

ATHA Tool Co., Newark, N. J.

CENTRAL Hardware Co., Philadelphia, Pa.

CHENEY Hammer Co., H., Little Falls, N. Y.

MAYDOLE Hammer Co., David, Norwich, N. Y.

VAN DOREN Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

WARNER Hammer Co., Cromwell, Conn.

MACHINISTS HAMMERS

ATHA Tool Co., Newark, N. J.

BEALL Bros., Alton, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BUFFUM Tool Co., Louisiana, Mo.

CHENEY Hammer Co., H., Little Falls, N. Y.

EVANSVILLE Tool Works, Evansville, Ind.

HELLER Bros. Co., Newark, N. J.

HYDE Park Mfg. Co., Bernharts, Pa.

MAYDOLE Hammer Co., David., Norwich N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PERFECT HANDLE—See Smith & Co.

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

VAN DOREN Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VLCHEK Tool Co., Cleveland, O.

WARNER Hammer Co., Cromwell, Conn.

PNEUMATIC HAMMERS

(See Tools, Pneumatic)

POWER HAMMERS

BEAUDRY & Co., Boston, Mass. "Champion," "Peerless."

BECHE—See Nazel Engineering & Machine Works.

BILLINGS & Spencer Co., Hartford, Conn.

BLISS Co., E. W., Brooklyn, N. Y.

BRADLEY & Son, C. C., Syracuse, N. Y.

CHAMPION—See Beaudry & Co.

CLEVELAND Machine Specialty Co., Toledo, O.

DIENELT & Eisenhardt, Philadelphia, Pa.

JUSTICE & Co., P. S., Philadelphia, Pa.

LITTLE GIANT—See Mayer Bros. Co.

McLANE, J. B., North Reading, Mass.

MAC Gowan & Finigan Foundry & Machine Co., St. Louis, Mo. "Perfect."

MASSILLON Foundry & Machine Co., Massillon, O.

MAYER Bros. Co., Mankato, Minn. "Little Giant."

MERRILL Bros. Co., Maspeth, N. Y.

NAZEL Engineering & Machine Works, Philadelphia, Pa. "Beche."

NILES-BEMENT-POND Co., New York, N. Y.

PEERLESS—See Beaudry & Co.

PERFECT—See MacGowan & Finigan Foundry & Machine Co.

PETTINGELL Machine Co., Amesbury, Mass.

QUICKWORK—See Smith, H. Collier.

SCRANTON & Co., New Haven, Conn.

SMITH, H. Collier, Detroit, Mich. "Quickwork."

TOLEDO Machine & Tool Co., Toledo, O.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

WILLIAMS, White & Co., Moline, Ill.

STEAM HAMMERS

ALLIANCE Machine Co., Alliance, O.

BUFFALO Foundry & Machine Co., Buffalo, N. Y.

CHAMBERSBURG Engineering Co., Chambersburg, Pa.

ERIE Foundry Co., Erie, Pa.

McDOUGALL & Potter Co., New York, N. Y.

MASSILLON Foundry & Machine Co., Massillon, O.

MORGAN Engineering Co., Alliance, O.

NILES-BEMENT-POND Co., New York, N. Y.

HANDLES

FILE AND TOOL HANDLES

AMERICAN File Sharpener Co., Brooklyn, N. Y.

BLISS Mfg. Co., R., Pawtucket, R. I.

CASSADY-FAIRBANK Mfg. Co., Chicago, Ill.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

OHIO Tool Co., Columbus, O.

OSGOOD, J. L., Buffalo, N. Y.

PIQUA Handle & Mfg. Co., Piqua, O.

SANDUSKY Tool Co., Sandusky, O.

TROY File Works, Troy, N. Y.

UNION Hardware Co., Torrington, Conn.

HEADS

BORING HEADS

MARVIN & Casler Co., Canastota, N. Y.

HEATERS

GLUE HEATERS

ADVANCE Machinery Co., Toledo, O. "Wetmore."

FRANCIS Co., Chas. E., Rushville, Ind.

WETMORE—See Advance Machinery Co.

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Make the best Automobile wheels. Only one quality—the **best.**
Fifty-six years at vehicle wheel making.

ESTABLISHED 1855

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HEATERS (Continued)

SPECIAL GARAGE HEATERS

SCIENTIFIC Heater Co., Cleveland, O.

HOLDERS

LATHE AND PLANER TOOL HOLDERS

ALMOND Mfg. Co., T. R., 1 Maple Ave., Ashburnham, Mass.
(See page 437.)

AMERICAN Tool & Machine Co., Boston, Mass.
(See page 541.)

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

BOWN Machine Co., Battle Creek, Mich.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CARR—See Thompson & Son Co.

CELFOR Tool Co., Buchanan, Mich.

CHAMPION—See Western Tool & Mfg. Co.

HANDY—See Morgan, B.

LANG Co., G. R., Meadville, Pa.

MINGST, C. P., Evansville, Ind.

MORGAN, B., Newport, R. I. "Handy."

O. K. Tool Holder Co., Shelton, Conn.

READY Tool Co., Bridgeport, Conn. "Red-E."

RED-E—See Ready Tool Co.

THOMPSON & Son Co., Henry G., New Haven, Conn. "Carr."

VAN Doren Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

HORSES

HORSES, TRESTLES AND TRUCKS

BERKERT & Son, William, Pittsburg (N. S.), Pa.

FRASSE & Co., Peter A., New York, N. Y. "Hildreth."
(See page 589.)

HILDRETH—See Frasse & Co.

JOHNSTOWN Automobile Co., Johnstown, Pa.

NELSON Mfg. Co., Chicago, Ill.

INDICATORS

SPEED INDICATORS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN Instrument Co., Philadelphia, Pa.

DISSTON & Sons, Henry, Philadelphia, Pa.

GRANT Mfg. & Machine Co., Bridgeport, Conn. "Tabor."
(See page 519.)

STARRETT Co., L. S., Athol, Mass.

TABOR—See Grant Mfg. & Machine Co.

VEEDER Mfg. Co., Hartford, Conn.

WOODMAN Mfg. & Supply Co., R., Boston, Mass.

IRONS

TUYERE IRONS

AMERICAN Foundry & Mfg. Co., St. Louis, Mo.

BOYNTON & Plummer, Worcester, Mass.

BUFFALO Forge Co., Buffalo, N. Y.

ILLINOIS Iron & Bolt Co., Carpentersville, Ill.

NATIONAL Novelty Corp., New York, N. Y.

ROOTS Co., P. H. & F. M., Connersville, Ind.

SWETT Iron Works, A. L., Medina, N. Y.

JOINTERS

GLUE JOINTERS

BERLIN Machine Works, Beloit, Wis.

FALLS Machine Co., Sheboygan Falls, Wis.

FAY & Egan Co., Cincinnati, O.

LINDERMAN Machine Co., Muskegon, Mich.

KETTLES

SODA AND POTASH KETTLES

BROWN & Sharpe Mfg. Co., Providence, R. I.

CLEVELAND Machine Specialty Co., Toledo, O.

GRAY & Prior Machine Co., Hartford, Conn.

KOVEN & Bro., L. O., 50 Cliff St., New York, N. Y.
(See page 441.)

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

MATHER & Warchter, Cleveland, O.

KEYS

MACHINE KEYS

PENNSYLVANIA Shafting Co., Spring City, Pa.

STANDARD Gauge Steel Co., Beaver Falls, Pa.
(See page 353.)

WHITNEY Mfg. Co., Hartford, Conn. "Woodruff."
(See page 655.)

WOODRUFF—See Whitney Mfg. Co.

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Why Bother with Caustics or Inflammables to Clean

Greasy—Oily—Dirty

Machine Work

In the **Plating Dept., Machine Shop, Garage,** or wherever rapid and thorough cleansing is necessary?

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Write for more information.

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Aluminum Solder — **Manganese Bronze**
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For Kerosene or Gas

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Will repair 4 tubes or 2 tubes and 2 tires at same time in 20 to 30 minutes.

Heated by kerosene—can be used anywhere.

Steam heat under absolute steady control.

Automatic control makes perfect cure throughout. Heated in 10 minutes.

Guaranteed to give satisfaction.

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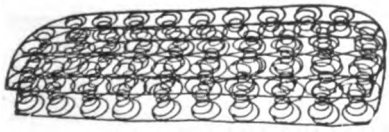
shown below is used by all the leading manufacturers of Automobiles in the East and has stood the test of ten years' service with satisfaction alike to makers of Cars as well as users.



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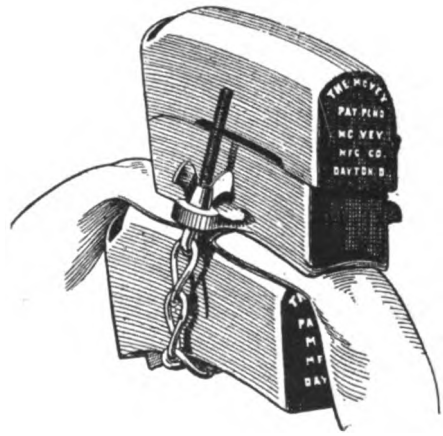

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BILLINGS & Spencer Co., Hartford, Conn.

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GRAHAM Mfg. Co., Providence, R. I.

MILLER Tool Co., New Britain, Conn.

O. K. Tool Holder Co., Shelton, Conn

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

WELCH Co., Thomas F., Boston, Mass.

LACQUERS

METAL LACQUERS

AMERICAN Lacquer Co., Bridgeport, Conn.

BARRETT & Co., M. L., Chicago, Ill.

CELLULOID Zapon Co., New York, N. Y.

COLOPHITE—See Rosenbluth & Co.

EGYPTIAN Lacquer Mfg. Co., New York, N. Y.

HANSON & Van Winkle Co., Newark, N. J.

MAAS & Waldstein Co., New York, N. Y.

NIKOLAS & Co., G. J., Chicago, Ill.

ROSENBLUTH & Co., A. J., New Haven, Conn. "Colophite."

ZINSSER & Co., W., New York, N. Y.

LATHES

BENCH OR PRECISION LATHES

AMERICAN Watch Tool Co., Waltham, Mass.

AMES & Co., B. C., Waltham, Mass.

ELGIN Tool Works, Elgin, Ill.

GOODELL-PRATT Co., Greenfield, Mass.

HARDINGE Bros., Chicago, Ill.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

REMINGTON Tool & Machine Co., Woburn, Mass.

RIVETT Lathe & Grinder Co., Boston, Mass.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

SLOAN & Chace Mfg. Co., Newark, N. J.

STARK Tool Co., Waltham, Mass. (See page 509.)

VAN NORMAN Machine Tool Co., Springfield, Mass.

WALTHAM Machine Works, Waltham, Mass.

BUFFING LATHES

(See Machines, Buffing and Polishing)

CRANK PIN LATHES

AMERICAN Tool Works Co., Cincinnati, O.

BOGERT, John L., Flushing, N. Y.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

TINDELL-MORRIS Co., Eddystone, Pa.

ENGINE LATHES

AMERICAN Tool Works Co., Cincinnati, O.

BARKER & Co., Wm., Covington, Ky.

BARNES Co., W. F. & John, Rockford, Ill.

BARNES Drill Co., Rockford, Ill.

BOYE & Emmes Machine Tool Co., Cincinnati, O.

BRADFORD Machine Tool Co., Cincinnati, O.

CARROLL-JAMIESON Machine Tool Co., Batavia, O.

CHAMPION Tool Works Co., Cincinnati, O.

CINCINNATI Lathe & Tool Co., Cincinnati, O.

CONOVER-OVERKAMP Machine & Tool Co., Dayton, O.

DAVIS Machine Co., W. P., Rochester, N. Y

FAY Machine Tool Co., Philadelphia, Pa.

FITCHBURG Machine Works, Fitchburg, Mass. "Lo-Swing."

FLATHER & Co., Nashua, N. H.

GREAVES, Klusman & Co., Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HENDEY Machine Co., Torrington, Conn.

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LO-SWING—See Fitchburg Machine Works.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MILWAUKEE Machine Tool Co., Milwaukee, Wis.

MORRIS Machine Tool Co., John B., Cincinnati, O. "Schellenbach."

NEW Haven Mfg. Co., New Haven, Conn.

NILES-BEMENT-POND Co., New York, N. Y.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

PUTNAM Machine Co., Fitchburg, Mass.

RAHN-LARMON Co., Cincinnati, O.

REED-PRENTICE Co., Worcester, Mass.

ROBBINS Machine Co., Worcester, Mass.

ROCKFORD Drilling Machine Co., Rockford, Ill.

ROCKFORD Lathe & Drill Co., Rockford, Ill.

ROCKFORD Tool Co., Rockford, Ill.

SCHELLENBACH—See Morris Machine Tool Co.

SEBASTIAN Lathe Co., Cincinnati, O.

SENECA Falls Mfg. Co., Seneca Falls, N. Y. "Star."

SHEPARD Lathe Co., Cincinnati, O.

SOUTH Bend Machine Tool Co., South Bend, Ind.

SPRINGFIELD Machine Tool Co., Springfield, O.

STAPF & Co., John B., Dunkirk, N. Y.

STAR—See Seneca Falls Mfg. Co.

VON Wyck Machine Tool Co., Cincinnati, O.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WILLARD Machine & Tool Co., Cincinnati, O.

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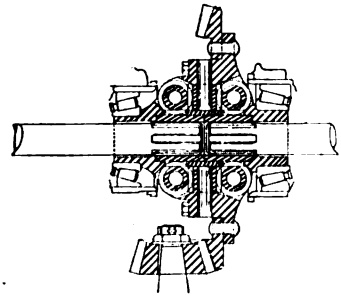
The "Muehl" Differential



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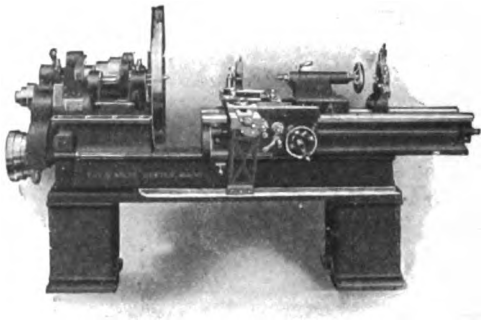

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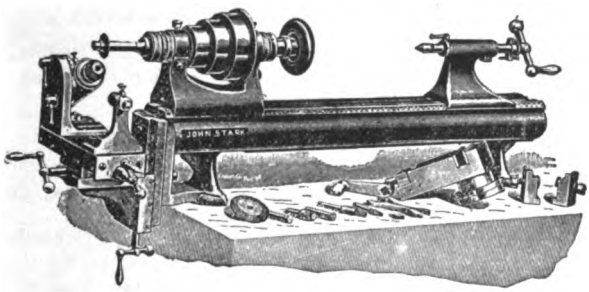
BRANCHES AT

Boston Buffalo Syracuse Rochester Scranton

STARK NO. 4 BENCH LATHE

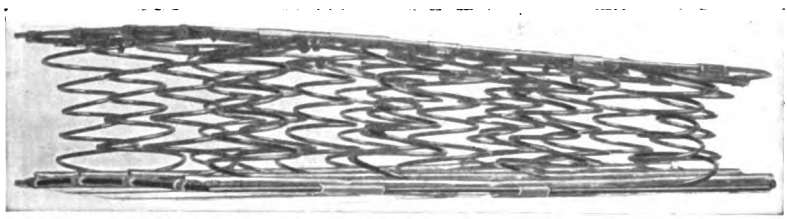


With Milling Machine Attachment

Length of bed, 38 inches—swing 9 inches—capacity of chuck ¾-in.—weight 185 lbs.

STARK LATHE ACCURACY is known and appreciated wherever bench tools are used. We have had 48 years' experience in building these lathes and can guarantee their efficiency absolutely. Ask today for our descriptive Catalogue No. 25.

STARK TOOL COMPANY
Waltham, Mass.



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The Royal Arch Auxiliary Cushion Spring

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DETROIT WIRE SPRING COMPANY, Detroit, Michigan

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LATHES (Continued)

FORMING LATHES

MERIDEN Machine Tool Co., Meriden, Conn. "Yankee."

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

WARNER & Swasey Co., Cleveland, O.

YANKEE—See Meriden Machine Tool Co.

POLISHING LATHES

(See Machines, Buffing and Polishing)

PRECISION LATHES

(See Lathes, Bench or Precision)

TURRET LATHES

ACME Machine Tool Co., Cincinnati, O.

AMERICAN Tool Works Co., Cincinnati, O.

AMERICAN Tool & Machine Co., Boston, Mass. (See page 541.)

BARDONS & Oliver, Cleveland, O.

BOGERT, John L., Flushing, N. Y.

BOYE & Emmes Machine Tool Co., Cincinnati, O.

BRADFORD Machine Tool Co., Cincinnati, O.

BULLARD Machine Tool Co., Bridgeport, Conn.

DAVIS Machine Co., W. P., Rochester, N. Y.

DRESES Machine Tool Co., Cincinnati, O.

FAY & Scott, Dexter, Me.

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

GISHOLT Machine Co., Madison, Wis.

HAMILTON Machine Tool Co., Hamilton, O.

HARTNESS—See Jones & Lamson Machine Co.

INTERNATIONAL Machine Tool Co., Indianapolis, Ind. "Libby."

JONES & Lamson Machine Co., Springfield, Vt. "Hartness."

LE BLOND Machine Tool Co., R. K., Cincinnati, O.

LIBBY—See International Machine Tool Co.

LODGE & Shipley Machine Tool Co., Cincinnati, O.

MERIDEN Machine Tool Co., Meriden, Conn.

MODERN Machine Tool Co., Cincinnati, O.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn. (See page 547.)

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

RAHN-LARMON Co., Cincinnati, O.

REED-PRENTICE Co., Worcester, Mass.

SPRINGFIELD Machine Tool Co., Springfield, O.

STEINLE Turret Machine Co., Madison, Wis.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WARNER & Swasey Co., Cleveland, O.

WELLS & Son Co., F. E., Greenville, Mass.

WOOD Turret Machine Co., Brazil, Ind.

WOODWORKING LATHES

AMERICAN Saw Mill Machinery Co., New York, N. Y.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

FAY & Scott, Dexter, Me.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

OBER Mfg. Co., Chagrin Falls, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

ROBBINS Machine Co., Worcester, Mass.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

VALLEY City Machine Works, Grand Rapids, Mich.

LETTERS

PATTERN LETTERS

BENSKIN Mfg. Co., Canton, O. "Perfect."

BLISS Mfg. Co., E. C., 84 Chestnut St., North Attleboro, Mass. (See page 505.)

BRIM, A. W., Seneca Falls, N. Y.

BUTLER, A. G., New York, N. Y.

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y.

KNIGHT & Son, H. W., Seneca Falls, N. Y.

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

WELLMAN Pattern-Supply Co., Cleveland, O

LEVELS

SPIRIT LEVELS

ATHOL Machine Co., Athol, Mass.

CHAPIN-STEPHENS Co., Pine Meadow, Conn.

COLUMBIA—See Smith, E. G.

COOK—See Gould & Jackson.

DISSTON & Sons, Henry, Philadelphia, Pa.

GOODELL-PRATT Co., Greenfield, Mass.

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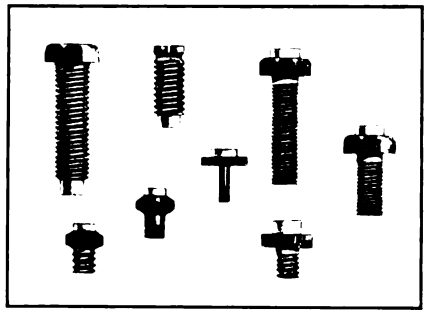
The New Way to Save Platinum



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Any styles made to order to any specifications and of any degree of Hardness.

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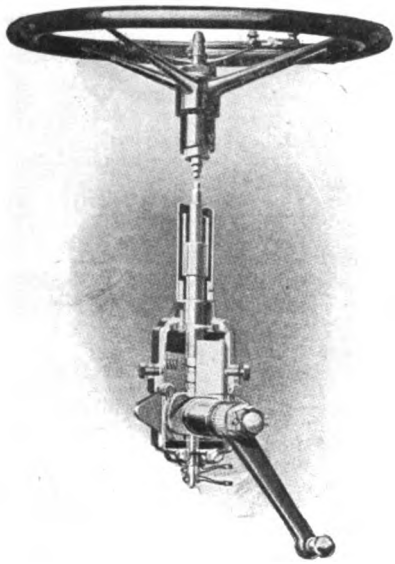

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We make more steering gears for trucks from 1000 lbs. to five tons than any other steering gear manufacturer.

BECAUSE : WHY

The truck manufacturers recognize the Lavigne Gear to be of superior design and the ultimate user knows it.

Standard For:

Commercial Cars and Trucks, 1000 lbs. to 5 tons capacity.
Heavy Fire Apparatus.
Pleasure Cars, weighing from 2000 lbs to 4500 lbs.

Four sizes, "A," "B," "C" and "E."
Write for Blue Prints.

The Lavigne Gear Company, Station "A" Racine, Wis.

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LEVELS (Continued)

SPIRIT LEVELS (Continued)

GOULD & Jackson, Watertown, N. Y. "Cook."
SMITH, E. G., Columbia, Pa. "Columbia."
STANLEY Rule & Level Co., New Britain, Conn.
STARRETT Co., L. S., Athol, Mass.

LOCKERS

METAL CLOTHES LOCKERS

BUFFALO Wire Works Co., Buffalo, N. Y.
CARPENTER-McWATTERS Co., Cleveland, O.
CLARK Co., W. J., Salem, O.
DARBY & Sons Co., Edward, Philadelphia, Pa.
DURAND-STEEL Locker Co., Chicago, Ill.
FEDERAL Steel Fixture Co., Chicago, Ill.
HART & Hutchinson Co., New Britain, Conn.
HETTS Co., Detroit, Mich.
LYON Metallic Mfg. Co., Aurora, Ill.
MANUFACTURING, Equipment & Engineering Co., Boston, Mass.
MERRITT Co., Camden, N. J.
NEW BRITAIN Machine Co., New Britain, Conn.
SMITH Wire & Iron Works, F. P., Chicago, Ill.
TERRELL'S Equipment Co., Grand Rapids, Mich.
VAN Dorn Iron Works, Cleveland, O.

LUBRICANTS

CUTTING LUBRICANTS

AJAX—See Phoenix Oil Co.
CUT-RITE—See Phoenix Oil Co.
FOOTE, Pierson & Co., New York, N. Y. "Lubria."
L-O—See Richards, G. Whitfield.
LUBE-WELL—See Richards, G. Whitfield.
LUBRI-KOOL—See Richards, G. Whitfield.
LUBRIA—See Foote, Pierson & Co.
PHOENIX Oil Co., Cleveland, O. "Ajax," "Cut-rite."
RICHARDS, G. Whitfield, Philadelphia, Pa. "Lube-Well," "L-O," "Lubri-Kool."

MACHINERY

DEALERS IN MACHINERY

(This is a list of Dealers in Machinery who advertise in this Publication)

FRASSE & Co., Peter A., New York, N. Y. (See page 589.)
HARRIS Bros. Co., Detroit, Mich. (See page 673.)
MONTGOMERY & Co., 105-07 Fulton St., New York, N. Y. (See page 495.)
PRENTISS Tool & Supply Co., 149 Broadway, New York, N. Y. (See page 509.)

SAND MIXING AND CONVEYING MACHINERY

BARBOUR-STOCKWELL Co., Cambridgeport, Mass.
PANGBORN Corp., Hagerstown, Md.
STANDARD Sand & Machine Co., Cleveland, O.

MACHINES

ABRASIVE METAL CUTTING MACHINES

SLACK Mfg. Co., Springfield, Vt.

AUTOGENOUS WELDING MACHINES

AMCO—See Milburn Co.
ASHTON, Laird & Co., New York, N. Y. "Astra."
ASTRA—See Ashton, Laird & Co.
BUCKEYE—See MacLeod & Co.
COX Brass Mfg. Co., Albany, N. Y. (See page 467.)
DAVIS-BOURNONVILLE Co., Jersey City, N. J.
DELCAMPE Welding Co., Bridgeport, Conn.
DYER Apparatus Co., 30 Piedmont St., Boston, Mass. (See page 519.)
ECONOMY Welding Machine Co., Kansas City, Mo.
ELLINGER Mfg. Co., Walter, Sheboygan, Wis.
GENERAL Welding Co., Hoboken, N. J.
GOODYEAR, Nelson, New York, N. Y.
HAVENS Bros. Mfg. Co., Denver, Colo.
HENDERSON-WILLIS Welding & Cutting Co., St. Louis, Mo.
JAHNKE Welding & Supply Co., San Francisco, Cal.
MACLEOD & Co., Walter, Cincinnati, O "Buckeye."
MESSER & Co., Philadelphia, Pa.
METAL Welding & Supply Co., Denver, Colo.
MILBURN Co., Alexander, Baltimore, Md. "Amco."
NORTHERN Welding Co., Minneapolis, Minn. "Vulcan."
OXWELD Acetylene Co., Chicago, Ill.
OXY-CARBI Co., New Haven, Conn.
PREST-O-LITE Co., Indianapolis, Ind.
SANFORD Mfg. Co., F. C., Bridgeport, Conn.
SCHAAP Automobile Co., Brooklyn, N. Y.
TOLMAN Mfg. Co., 19-21 W. Third St., Boston, Mass. (See page 513.)
VULCAN—See Northern Welding Co.
WATERHOUSE Welding Co., Boston, Mass.
WESTERN Welding & Mfg. Co., Chicago, Ill.

BLUE PRINTING MACHINES

BLUE Streak—See Revolute Machine Co.
BUCKEYE Engine Co., Salem, O. (See page 577.)
KEUFFEL & Esser Co., Hoboken, N. J.
PEASE Co., C. F., Chicago, Ill.
REVOLUTE Machine Co., New York, N. Y. "Blue Streak."

BOLT HEADING MACHINES

ACME Machinery Co., Cleveland, O.
AJAX Mfg. Co., Cleveland, O.
BROWN Co., H. B., East Hampton, Conn. "Davis."
BURDICT—See Howard Iron Works.

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Electric Welding
is the
Modern Method
of assembling metal parts.

YOU Need a Welder.
WE build electric welding machines for every purpose and sell them without any *strings* attached.

Won't you tell us what you want to weld and we will mail prices and all data.

The National Electric Welder Co.
Warren, Ohio, U. S. A.

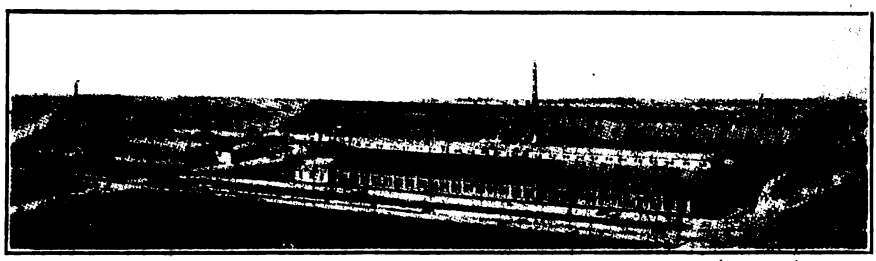
A New and Wonderful WELDING APPARATUS

Saves 15 per cent. in Time and Gas.
No More Flash-back.
No More Loss of Time.
No More Cooled off Metal.

Send for catalogue giving full particulars concerning the

Tolman Welding Outfit

TOLMAN MFG. CO.
19 & 21 West 3d St.
BOSTON, MASS.



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Our New Plant adds 33 1/3% to our capacity.

If you are in the market, write us. We can interest you. Our engineer is at your service without expense to you.

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HESS-PONTIAC
SPRING
&
AXLE
COMPANY
PONTIAC, MICHIGAN

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MACHINES (Continued)

BOLT HEADING MACHINES (Continued)

COOK Co., Asa S., Hartford, Conn.

DAVIS—See Brown Co.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

NATIONAL Machinery Co., Tiffin, O.

NEW Doty Mfg. Co., Jamesville, Wis.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

BOLT POINTING MACHINES

ACME Machinery Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn. "Merriman."

BURDICT—See Howard Iron Works.

COOK Co., Asa S., Hartford, Conn.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

LANDIS Machine Co., Waynesboro, Pa.

MERRIMAN—See Brown Co.

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

WEBSTER & Perks Tool Co., Springfield, O.

BOLT THREADING MACHINES

ACME Machinery Co., Cleveland, O.

BROWN Co., H. B., East Hampton, Conn. "Merriman."

BURDICT—See Howard Iron Works.

COOK Co., Asa S., Hartford, Conn.

FOOTE-BURT Co., Cleveland, O. "Reliance."

GREEN RIVER—See Wiley & Russell Mfg. Co.

HERCULES—See Wells & Son Co.

HOWARD Iron Works, Buffalo, N. Y. "Burdict."

LANDIS Machine Co., Waynesboro, Pa.

LITTLE GIANT—See Wells Bros. Co.

MERRIMAN—See Brown Co.

NATIONAL Machinery Co., Tiffin, O.

NILES-BEMENT-POND Co., New York, N.Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

RELIANCE—See Foote-Burt Co.

WEBSTER & Perks Tool Co., Springfield, O.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

WELLS & Son Co., F. E., Greenfield, Mass. "Hercules."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Green River." (See page 545.)

BORING MACHINES

(Horizontal)

BEAMAN & Smith Co., Providence, R. I.

BINSSE Machine Co., Harrison, N. J.

ESPEN-LUCAS Machine Works, Philadelphia, Pa.

GISHOLT Machine Co., Madison, Wis.

LUCAS Machine Tool Co., Cleveland, O.

NILES-BEMENT-POND Co., New York, N. Y.

ROCHESTER Boring Machine Co., Rochester, N. Y.

UNIVERSAL Boring Machine Co., Hudson, Mass.

BORING MACHINES

(Vertical)

BAKER Bros., Toledo, O.

BEAMAN & SMITH Co., Providence, R. I.

BULLARD Machine Tool Co., Bridgeport, Conn.

COLBURN Machine Tool Co., Franklin, Pa.

HOEFER Mfg. Co., Freeport, Ill.

KING Machine Tool Co., Cincinnati, O.

MOLINE Tool Co., Moline, Ill.

NILES-BEMENT-POND Co., New York, N. Y.

ROCKFORD Drilling Machine Co., Rockford, Ill.

BUFFING AND POLISHING MACHINES

BENNETT-O'CONNELL Co., Chicago, Ill.

BLOUNT Co., J. G., Dept. A, Everett, Mass. (See page 471.)

BRIDGEPORT Safety Emery Wheel Co., Bridgeport, Conn.

BUILDERS Iron Foundry, Providence, R. I.

CHALLENGE Machine Co., Philadelphia, Pa.

DIAMOND Machine Co., Providence, R. I.

GARDNER Machine Co., Beloit, Wis.

GARLAND—See Sibley-Houfley Machine Co.

NEW Britain Machine Co., 10 Bigelow St., New Britain, Conn. (See page 547.)

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

RANSOM Mfg. Co., Oshkosh, Wis.

ST. LOUIS Machine Tool Co., St. Louis, Mo.

SIBLEY-HOUFLEY Machine Co., Detroit, Mich. "Garland."

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

VALLEY City Machine Works, Grand Rapids, Mich.

WEBSTER & Perks Tool Co., Springfield O.

CAM CUTTING MACHINES

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

STANDARD Machinery Co., 7 Beverly St., Providence, R .I. (See page 469.)

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WE supply more Dashes to the Automobile Trade than all other manufacturers combined. We have the EXPERIENCE and we have the CAPACITY to fill orders.

HANSON-WARD VENEER COMPANY
Bay City, Michigan

We can make immediate shipment

ALUMINUM

on No. 1 and No. 12 Alloy

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Workmanship and Material Guaranteed.

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Specialized in

Auto Steel Castings

4500 hands
Large machine moulding plant +GF+ Quick delivery of large quantities

HIGH STRESS MATERIAL

Excellent machining quality, big saving in Time and Tools. After the most careful *Annealing* castings are straightened and come full flawless and true to design. We will make your patterns. Quotations upon application with blue prints to (full address).

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MACHINES (Continued)

CORE MAKING MACHINES

BROWN Specialty Machinery Co., Chicago, Ill. "Hammer."

DIAMOND Clamp & Flask Co., Richmond, Ind.

HAMMER—See Brown Specialty Machinery Co.

CORE WIRE STRAIGHTENING AND CUTTING MACHINES

BLAKE Mfg. Co., Geo. F., New York, N. Y. "Climax."

CLIMAX—See Blake Mfg. Co.

GREGG Mfg. Co., Cleveland, O.

CRIMPING AND BEADING MACHINES

NIAGARA Machine & Tool Works, Buffalo, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PETTINGELL Machine Co., Amesbury, Mass.

CUTTING-OFF MACHINES

BROWN & Sharpe Mfg. Co., Providence, R. I.

DAVIS Machine Co., W. P., Rochester, N. Y.

HURLBURT-ROGERS Machine Co., South Sudbury, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

DRILLING MACHINES

(See Drills)

ELECTRIC WELDING MACHINES

GEUDER, Paeschke & Frey Co., Milwaukee, Wis.

NATIONAL Electric Welder Co., Warren, O. (See page 513.)

THOMSON Electric Welding Co., Lynn, Mass.

TOLEDO Electric Welder Co., Cincinnati, O.

UNIVERSAL Electric Welding Co., New York, N. Y.

WINFIELD Electric Welding Machine Co., Warren, O.

FILING MACHINES

AMES & Co., B. C., Waltham, Mass.

COCHRANE-BLY Co., Rochester, N. Y.

HARTFORD—See Robinson Tool Works.

ROBINSON Tool Works, Waterbury, Conn. "Hartford."

GEAR CUTTING MACHINES

BROWN & Sharpe Mfg. Co., Providence, R. I.

CINCINNATI Gear Cutting Machine Co., Cincinnati, O.

FELLOWS Gear Shaper Co., 24 Pearl St., Springfield, Vt. (See page 517.)

FLATHER Mfg. Co., E. J., Nashua, N. H.

GARVIN Machine Co., New York, N. Y.

GLEASON Works, Rochester, N. Y.

GOULD & Eberhardt, Newark, N J.

GRANT-LEES Gear Co., 2368 69th St., Cleveland, O. (See page 211.)

LEES-BRADNER Co., Cleveland, O.

NEWARK Gear Cutting Machine Co., Newark, N. J.

SCHUCHARDT & Schutte, New York, N. Y. (Importers.)

SLOAN & Chace Mfg. Co., Newark, N. J.

STANDARD Mfg. Co., Bridgeport, Conn.

WHITON Machine Co., D. E., New London, Conn.

GEAR HOBBING MACHINES

ADAMS Co., Dubuque, Ia.

BARBER-COLMAN Co., Rockford, Ill.

GOULD & Eberhardt, Newark, N. J.

LEES-BRADNER Co., Cleveland, O.

MEISSELBACH-CATUCCI Mfg. Co., Newark, N. J.

NEWARK Gear Cutting Machine Co., Newark, N. J.

REYNOLDS Pattern & Machine Co., Moline, Ill.

SCHUCHARDT & Schutte, New York, N. Y. (Importers.)

GEAR TOOTH CHAMFERING MACHINES

SCHUCHARDT & Schutte, New York, N. Y. (Importers.)

HAIR PICKING MACHINES

LOUNSBERY & Sons, G. H., Cincinnati, O.

PRIZE—See Willcomb Co.

WILLCOMB Co., Geo., Boston, Mass. "Prize."

KEY SEATING MACHINES

BAKER Bros., Toledo, O. "Colburn."

BURR & Sons, John T., Brooklyn, N. Y.

COLBURN—See Baker Bros.

DAVIS Machine Co., W. P., Rochester, N. Y.

GIANT—See Mitts & Merrill.

LAPOINTE Machine Tool Co., Hudson, Mass.

MITTS & Merrill, Saginaw, Mich. "Giant."

NATIONAL Machine Tool Co., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

PAWTUCKET Mfg. Co., Pawtucket, R. I.

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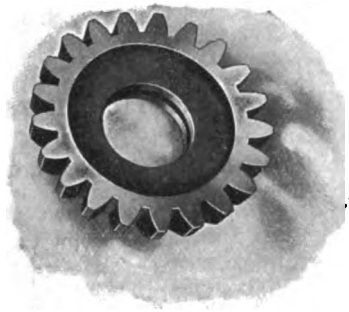

THE GEAR SHAPER CUTTER

Plane Your Gears
by the
Gear Shaper System

which uses a ground generating cutter. In addition to cutting faster and turning out smoother gears than any other machine, it planes cluster and internal gears from the solid blank. A very large per cent of all automobile gears are cut on the Gear Shaper.

THE FELLOWS GEAR SHAPER CO.
24 Pearl Street, SPRINGFIELD, VT., U.S.A.

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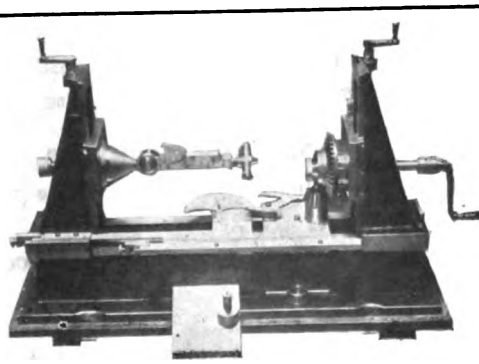
¶ The manufacturers who use ERGON MOTORS, however, are going to be in better shape in so far as getting delivery on their motors is concerned. We always have prided ourselves on keeping to schedule and in case of need in being able to co-operate with our patrons in meeting extraordinary requirements.

¶ This is an assurance of confidence to our present patrons—as well also an invitation to far sighted manufacturers to investigate our product, facilities for production and our business integrity.

HAZARD MOTOR
MANUFACTURING
COMPANY
Rochester, N. Y.



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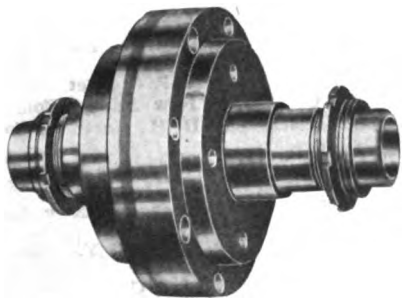
The Universal-Bevel-Spur and Spira
Gear testing instrument

Manufactured by

Feicht-Bevington Mfg. Co
Cleveland, O.

Fits Any Axle



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It's the simplest, most durable, most powerful, gearless differential that does this.

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MACHINES (Continued)

LEATHER MEASURING MACHINES

NIGHTINGALE, J. E., Danvers, Mass.
TUFTING Machine Supply Co., Detroit, Mich.
TURNER Tanning Machinery Co., Peabody, Mass.

MARKING MACHINES

GORTON Machine Co., George, Racine, Wis.

MILLING MACHINES

ADAMS Co., Dubuque, Ia.
BEAMAN & Smith Co., Providence, R. I.
BECKER Milling Machine Co., Hyde Park, Mass.
BRIGGS—See Gooley & Edlund.
BROWN & Sharpe Mfg. Co., Providence, R. I.
BURKE Machine Tool Co., Conneaut, O.
CARTER & Hakes Co., Winsted, Conn.
CHICAGO Machine Tool Co., Chicago, Ill.
CINCINNATI Milling Machine Co., Cincinnati, O.
FOSDICK Machine Tool Co., Cincinnati, O.
FOX Machine Co., Grand Rapids, Mich.
GARVIN Machine Co., New York, N. Y.
GOOLEY & Edlund, Syracuse, N. Y. "Briggs."
HENDEY Machine Co., Torrington, Conn.
INGERSOLL Milling Machine Co., Rockford, Ill.
KEARNEY & Trecker Co., Milwaukee, Wis. "Milwaukee."
KEMPSMITH Mfg. Co., Milwaukee, Wis.
KNIGHT Machinery Co., W. B., St. Louis, Mo.
LE BLOND Machine Tool Co., R. K., Cincinnati, O.
MILWAUKEE—See Kearney & Trecker Co.
OESTERLEIN Machine Co., Cincinnati, O.
PRATT & Whitney Co., Hartford, Conn. (See page 463.)
ROCHESTER Boring Machine Co., Rochester, N. Y.
ROCKFORD Machine Tool Co., Rockford, Ill.
ROCKFORD Milling Machine Co., Rockford, Ill.
SLOAN & CHACE Mfg. Co., Newark, N. J.
STEPTOE Shaper Co., John, Cincinnati, O.
THURSTON Mfg. Co., Providence, R. I.
VALLEY City Machine Works, Grand Rapids, Mich.
VAN NORMAN Machine Tool Co., Springfield, Mass.
WHITNEY Mfg. Co., Hartford Conn. (See page 655.)

MOTOR DECARBONIZING MACHINES

(See also Compounds, Carbon; also Removers, Carbon)

ADAMS, Geo. B., New York, N. Y. "Dy-Karbo."
ASHTON, Laird & Co., New York, N. Y. "Astra."
ASTRA—See Ashton, Laird & Co.
BISHOP-BABCOCK-BECKER Co., Cleveland, O. "Eureka." (See page 519.)
COX Brass Mfg. Co., Albany, N. Y. (See page 467.)
DY-KARBO—See Adams, Geo. B.
DYER Apparatus Co., 39 Piedmont St., Boston, Mass. (See page 519.)
EUREKA—See Bishop-Babcock-Becker Co.
FERRIER Mfg. Co., G. F., Pittsburg, Pa.
HILT Co., R., Boston, Mass.
MESSER & Co., Philadelphia, Pa.
OXWELD Acetylene Co., Chicago, Ill.
OXY-DECARBONIZER Co., Boston, Mass.
OXYGEN Decarbonizer Co., Troy, N. Y.
OZO Co., Boston, Mass.
VULITE Chemical Co., Boston, Mass.

NUT TAPPING MACHINES

ACME Machinery Co., Cleveland, O.
AUTOMATIC Machine Co., Bridgeport, Conn. "Coulter."
BROWN Co., H. B., East Hampton, Conn.
COULTER—See Automatic Machine Co.
HOWARD Iron Works, Buffalo, N. Y. "Schlenker."
LANDIS Machine Co., Waynesboro, Pa.
LITTLE GIANT—See Wells Bros. Co.
NATIONAL Machinery Co., Tiffin, O.
NILES-BEMENT-POND Co., New York, N. Y.
PAWTUCKET Mfg. Co., Pawtucket, R. I.
REED Co., Francis, Worcester, Mass.
SCHLENKER—See Howard Iron Works.
WEBSTER & Perks Tool Co., Springfield, O.
WELLS Bros. Co., Greenfield, Mass. "Little Giant."
WELLS & Son Co., F. E., Greenfield, Mass.

PISTON RING MACHINES

(Semi-Automatic)

GRIDLEY—See Windsor Machine Co.
WINDSOR Machine Co. Windsor, Vt. "Gridley."

POLISHING MACHINES

(See Machines, Buffing and Polishing)

PROFILING MACHINES

BECKER Milling Machine Co., Hyde Park, Mass.
GARVIN Machine Co., New York, N. Y.
PRATT & Whitney Co., Hartford, Conn. (See page 463.)

RIVETING MACHINES

CINCINNATI Pulley Machinery Co., Cincinnati, O.
EVELAND Engineering & Mfg. Co., Philadelphia, Pa.
GRANT Mfg. & Machine Co., Bridgeport Conn. (See page 519.)
NILES-BEMENT-POND Co., New York, N. Y.
PAWTUCKET Mfg. Co., Pawtucket, R. I.
SHUSTER Co., F. B., New Haven, Conn.
TOWNSEND Mfg. Co., H. P., Hartford, Conn.

SAND BLAST MACHINES

AMERICAN Diamond Blast Co., New York, N. Y.
BETTON, J. M., New York, N. Y. "Drucklieb."
BUCKEYE—See MacLeod & Co.
CURTIS & Co., Mfg. Co., St. Louis, Mo.

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The *Eureka* DE-CARBONIZING DEVICE *Removes Carbon From Engine Cylinders*

Quickly - Thoroughly - Economically

This is the only efficient method of cleaning carbon from engine cylinders. The Eureka device removes every particle of carbon, and works quickly (only 5 to 10 minutes per cylinder) and there is no possibility of damaging the cylinder as when the scraping method is used. Anyone can operate the Eureka De-Carbonizing Device successfully. Absolutely safe.

Big possibilities for garages to increase their profits with the Eureka Device. Write today for quotations.

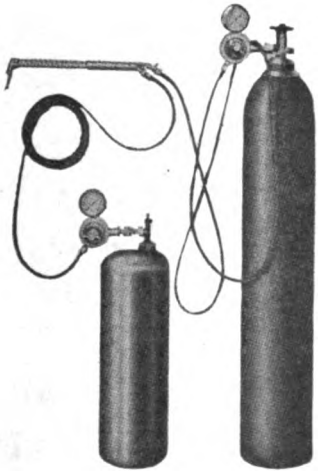
We have an attractive proposition for Live Jobbers and Dealers. Get particulars now.

The Bishop - Babcock - Becker Co.

CLEVELAND, O.

New York Chicago Milwaukee Cincinnati
St. Paul St. Louis San Francisco

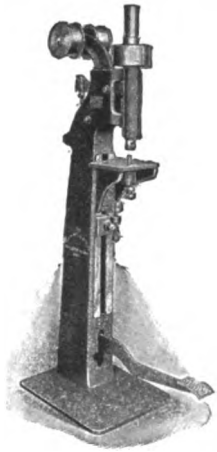
A TOOL FOR WELDING, BRAZING STRAIGHTENING, SOLDERING REMOVING CARBON



OUTFIT ASSEMBLED TO PRESTO AND 100ft. OXYGEN TANK
Tanks Not Included
We sell everything for WELDING

The DYER APPARATUS COMPANY
39 Piedmont Street, BOSTON, MASS.

"Our Grant Riveter has given us no end of Satisfaction."
So Writes One of Our Customers.



A boy or girl at $1.00 a day is all that is required to operate the machine with perfect success.

The machine will do better work and much more rapidly than can be done by any other machine on the market.

We invite you to send us samples of your work, which we shall rivet and return to you, giving estimate of output and any other information you may desire.

Send for catalog which shows severa different sizes and styles of machines for different requirements.

The Grant Mfg. & Machine Co.
BRIDGEPORT, CONN.

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MACHINES (Continued)

SAND BLAST MACHINES (Continued)

DANIC—See Nichols Iron Works.

DRUCKLIEB—See Betton, J. M.

MACLEOD & Co., Walter, Cincinnati, O. "Buckeye."

NIAGARA Devices, 614 Ellicott Sq., Buffalo, N. Y. (See page 521.)

NICHOLS Iron Works, D. M., New York, N. Y. "Danic."

PANGBORN Corp., Hagerstown, Md.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 521.)

SLY Mfg. Co., W. W., Cleveland, O.

TILGHMAN-BROOKSAND Sand Blast Co., Philadelphia, Pa.

SAW SHARPENING MACHINES

COCHRANE-BLY Co., Rochester, N. Y.

HUNTER Saw & Machine Co., Pittsburg, Pa.

NUTTER & Barnes Co., Hinsdale, N. H.

SCREW MACHINES

(Automatic)

AUTOMATIC Machine Co., Bridgeport, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

CHICAGO Automatic Machine Co., Chicago, Ill.

CLEVELAND Automatic Machine Co., Cleveland, O.

DAVIS Sewing Machine Co., Dayton, O. "Lester."

DAVENPORT Machine Tool Co., New Bedford, Mass.

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

GRIDLEY—See Windsor Machine Co.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 429.)

LESTER—See Davis Sewing Machine Co.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 359.)

PEERLESS Automatic Machine Co., Cleveland, O.

POTTER & Johnston Machine Co., Pawtucket, R. I.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

WINDSOR Machine Co., Windsor, Vt. "Gridley."

SCREW MACHINES

(Hand)

ACME Machine Tool Co., Cincinnati, O.

BARDONS & Oliver, Cleveland, O.

DRESES Machine Tool Co., Cincinnati, O.

FOSTER Machine Co., Elkhart, Ind.

GARVIN Machine Co., New York, N. Y.

SPRING COILING MACHINES

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

WARNER & Swasey Co., Cleveland, O.

COULTER & McKenzie Machine Co., Bridgeport, Conn.

GARVIN Machine Co., New York, N. Y.

HOEFER—See Wells Co.

WELLS Co., Frank L., Kenosha, Wis. "Hoefer."

SPRING TESTING MACHINES

COULTER & McKenzie Machine Co., Bridgeport, Conn.

TAPPING MACHINES

BAKER Bros., Toledo, O.

GARVIN Machine Co., New York, N. Y.

HARTFORD Machine Screw Co., Hartford, Conn. (See page 429.)

NATIONAL Machine Co., Hartford, Conn.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

ST. LOUIS Machine Tool Co., St. Louis, Mo

TIRE BANDAGE WRAPPING MACHINES

MILLER, Chas. E., Anderson, Ind.

ROSSMAN, Roy G., Seattle, Wash.

UPHOLSTERY BUTTON MACHINES

LOUNSBERY & Sons, G. H., Cincinnati, O.

TUFTING Machine Supply Co., Detroit, Mich.

UPHOLSTERY TUFTING MACHINES

BUSER-POSTON Tufting Machine Co., Chillicothe, O.

NOVELTY Tufting Machine Co., 268 Jefferson Ave. E., Detroit, Mich. (See page 255.)

WIRE SPOKE SWAGING MACHINES

LANGELIER Mfg. Co., Providence, R. I.

WOOD BENDING MACHINES

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

WOOD BORING MACHINES

AJAX Mfg. Co., Pittsburg (N. S.), Pa.

AMERICAN Woodworking Machinery Co. Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

JONES Superior Machine Co., Chicago, Ill.

KANE & Roach, Syracuse, N. Y.

OBER Mfg. Co., Chagrin Falls, O.

OLIVER Machinery Co., Grand Rapids, Mich.

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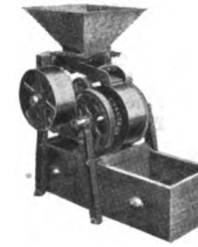
THE PAXSON-SAWYER MAGNETIC SEPARATOR



will separate iron and brass chips thoroughly. The magnets have been redesigned and by the use of the best Tungsten magnet steel the magnets are made practically permanent and at least three times as strong as formerly. The separator, for work within its capacity, is equal in efficiency to those having electro magnets.

Write for circular and additional information and prices. We can also furnish new magnets, brushes and other spare parts for old machines.

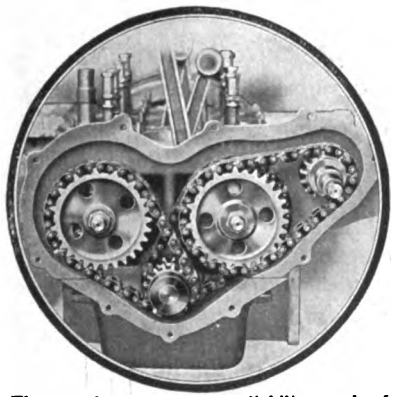
PAXSON-WARREN SAND BLAST MACHINERY

is most advantageously used for cleaning forgings, castings and hardened steel gears and other parts that are used in automobile construction. All machines are tested to 100 lbs. pressure. For the general run of work, however, 20 to 30 lbs. is ample and most economical. Write for complete information and prices.

J. W. PAXSON CO.

1019 N. DELAWARE AVENUE

PHILADELPHIA **PENNA.**



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Herbert F. L. Funke Co., Inc.

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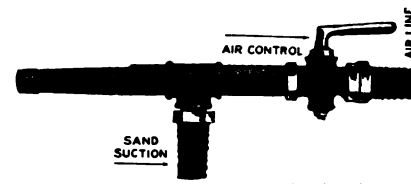
$25.00 Are the prices of **$15.00**

PORTABLE

NIAGARA STANDARD SAND BLAST

NIAGARA MEDIUM SAND BLAST



Attach to main or extended air lines AT POINT NEAREST WORK. Sand syphoned from pile, pit, pail or barrel.

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Lowest Consumption of Free Air. Only **ONE FIFTEENTH** the amount other Sand Blasts require.

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NIAGARA **PAINT SPRAY & CLEANER** for Blackening Molds, Calcimining, Painting with Oil or Water Colors, Stirs Paints, Washes Machinery, has many other uses.

PRICE **$10.00**

The **NIAGARA DEVICES** are in use from **Coast** to **Coast** by most every line of Industry.

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MACHINES (Continued)

WOOD BORING MACHINES (Continued)

POWER & Co., L., Philadelphia, Pa.
PRYIBIL, P., New York, N. Y.
SMITH Machine Co., H. B., Smithville, N. J.
VALLEY City Machine Works, Grand Rapids, Mich.

WOOD MORTISING AND TENONING MACHINES

AMERICAN Woodworking Machinery Co., Rochester, N. Y.
CORDESMAN-RECHTIN Co., Cincinnati, O.
DEFIANCE Machine Works, Defiance, O.
FAY & Egan Co., J. A., Cincinnati, O.
GREENLEE Bros. & Co., Rockford, Ill.
OLIVER Machinery Co., Grand Rapids, Mich.

MALLETS

WOODEN MALLETS

BLISS Mfg. Co., R., Pawtucket, R. I.
DELPHOS Mfg. Co., Delphos, O.
HELLENBERG & Son, J. B., Coldwater, Mich.
PIQUA Handle & Mfg. Co., Piqua, O.
SANDUSKY Tool Co., Sandusky, O.
UNION Hardware Co., Torrington, Conn.

MANDRELS

EXPANDING MANDRELS

CHAMPION—See Western Tool & Mfg. Co.
LE COUNT, Wm. G., South Norwalk, Conn.
McCROSKY Reamer Co., Meadville, Pa.
MORSE Twist Drill & Machine Co., New Bedford, Mass.
NICHOLSON & Co., W. H., Wilkes-Barre, Pa.
WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

METERS

CUT METERS

AMERICAN Ever Ready Co., New York, N. Y. "Ever Ready."
EVER READY—See American Ever Ready Co.
STEWART Speedometer Corp., Chicago, Ill. "Warner."
WARNER—See Stewart Speedometer Corp.

MICROMETERS

MICROMETER CALIPERS

BROWN & Sharpe Mfg. Co., Providence, R. I.
COLUMBIA—See Smith, E. G.
GOODELL-PRATT Co., Greenfield, Mass.
SLOCOMB Co., J. T., Providence, R. I.
SMITH, E. G., Columbia, Pa. "Columbia."
STARRETT Co., L. S., Athol, Mass.

MOLDS

SOFT HAMMER MOLDS

HORAT, J., Dept. H., Lafayette, Ind. (See page 523.)

TIRE VULCANIZING MOLDS AND CORES

BRIDGEWATER Machine Co., Akron, O.
MILLER, Chas. E., Anderson, Ind.
WILLIAMS Foundry & Machine Co., Akron, O.

OVENS

CORE BAKING OVENS

BLODGETT Co., G. S., Burlington, Vt.
BYRAM & Co., Detroit, Mich.
CALUMET Foundry Equipment Co., Harvey, Ill.
CULLEN-ATKINSON Co., Hartford, Conn.
FOUNDRY Equipment Co., Buffalo, N. Y.
GOETZ Co., Chicago, Ill.
HILL & Griffith Co., Cincinnati, O.
MILLETT Core Oven Co., Springfield, Mass.
MONARCH Engineering & Mfg. Co., Baltimore, Md.
OVEN Equipment & Mfg. Co., New Haven, Conn.
WHITING Foundry Equipment Co., Harvey, Ill

ENAMELING OVENS

AMERICAN Enamel Co., Providence, R. I. "Mascot."
BLODGETT Co., G. S., Burlington, Vt.
CULLEN-ATKINSON Co., Hartford, Conn.
MASCOT—See American Enamel Co.
MONARCH Engineering & Mfg. Co., Baltimore, Md.
NEIL & Co., Wm., Chicago, Ill.
OVEN Equipment & Mfg. Co., New Haven Conn.
ROCKWELL Co., W. S., New York, N. Y.

PAPER

EMERY AND SAND PAPER

AMERICAN Glue Co., Boston, Mass. "Union," "New England," "Boston."
BAEDER, Adamson & Co., New York, N. Y.
BEHR & Co., Herman, New York, N. Y. "Brooklyn."
BOSTON—See American Glue Co.
BROOKLYN—See Behr & Co.
CARBORUNDUM Co., Niagara Falls, N. Y.
NEW ENGLAND—See American Glue Co.
UNION—See American Glue Co.
WAUSAU Sandpaper Co., Wausau, Wis.

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"BECCO" SPECIALTIES SAVE TROUBLE

A FULL line of *TERMINALS*, which save cable soldering and which can be attached without the use of tools.

All sizes and types *OIL CAN HOLDERS* for trucks and pleasure cars. They locate the oil can and prevent spilling of oil and damaging the can.

WRENCH SETS for Motorcycles adapted for small bolts and nuts.

TOOL CASES made of steel with a place for each tool—much neater, handier and cleaner than tool rolls.

TIRE GRIPS to help replace Clincher tires used on all Ford cars.

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Detroit, Mich.

MAKE YOUR OWN SOFT METAL HAMMERS AND SAVE MONEY

Melt some lead and a little babbitt in the ladle attached—pour in the mold and when the metal is cold you have a hammer at a fraction of what it would cost to buy one.

You *need* soft metal hammers. Make them yourself as fast as you can use them. Not only will you save lots of time—but much money.

We send you everything necessary to do the work. Order from your Dealer or write us today. Special discount to Dealers. Address Dept. H.

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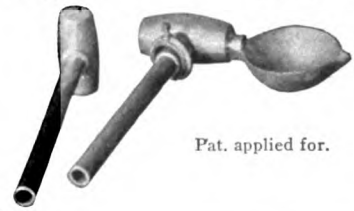
Manufacturer
Lafayette Indiana



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ROAD CHAMPION OF AMERICA

The Tacoma, Santa Monica, Elgin and Corona road races were won hands down by Stutz Cars equipped with the consistent Wisconsin Motor—the drivers never raising the hood. Winning all these big road events of the year has accorded Wisconsin Motors the title of **Road Champion of America.** Write for catalog describing the following sizes:

3¾"x5"	4 cyl. Enbloc	3¾"x5½"	6 cyl. Enbloc
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4½"x5½"	4 cyl. T Head	4½"x 5"	6 cyl. T Head
5¼"x7"	4 cyl. T Head	5½"x 7"	6 cyl. T Head

Wisconsin Motor Mfg. Co., Milwaukee, Wis.
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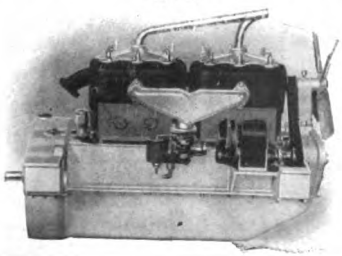

DON'T HAVE A SHABBY CAR USE FISK'S AUTO CAR SOAP

If you want to keep your automobile looking as bright as when it first left the factory, use

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AUTO-CAR SOAP

Put up in 5-lb. air tight tin pails,
10-lb wooden pails,
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Quarter barrels (about 100 lbs.)
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PLANERS

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BARTLETT, Edwin E., Boston, Mass. "Federal."

CHANDLER Planer Co., Ayer, Mass.

CINCINNATI Planer Co., Cincinnati, O.

CINCINNATI Shaper Co., Cincinnati, O.

FEDERAL—See Bartlett, Edwin E.

FLATHER Planer & Shaper Co., Nashua, N. H.

GRAY Co., G. A. Cincinnati, O.

HAMILTON Machine Tool Co., Hamilton, O.

HARRINGTON Son & Co., Edwin, Philadelphia, Pa.

KNECHT Planer Co., Cincinnati, O.

NILES-BEMENT-POND Co., New York, N. Y.

OHIO Machine Tool Co., Kenton, O.

POWELL Machine Co., Fitchburg, Mass.

PUTNAM Machine Co., Fitchburg, Mass.

ROCKFORD Machine Tool Co., Rockford, Ill.

STAPF & Co., John B., Dunkirk, N. Y.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WOODWARD & Powell Planer Co., Worcester, Mass.

WOOD PLANERS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Works, Beloit, Wis.

CONNELL & Dengler Machine Co., Rochester, N. Y.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

DEFIANCE Machine Works, Defiance, O.

FALLS Machine Co., Sheboygan Falls, Wis.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

JONES Superior Machine Co., Chicago, Ill.

KANE & Roach, Syracuse, N. Y.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL, P., New York, N. Y.

SCHNEIDER & Goosman Machine Co., Cincinnati, O.

SILVER Mfg. Co., Salem, O.

SMITH Machine Co., H. B., Smithville, N. J.

VALLEY City Machine Works, Grand Rapids, Mich.

WHITNEY & Son, Baxter D., Winchendon, Mass.

PLANES

WOODWORKERS PLANES

CHAPIN-STEVENS Co., Pine Meadow, Conn.

GAGE Tool Co., Vineland, N. J.

MACK & Co., Rochester, N. Y.

OHIO Tool Co., Columbus, O.

SANDUSKY Tool Co., Sandusky, O.

SARGENT & Co., New Haven, Conn.

STANLEY Rule & Level Co., New Britain, Conn.

PLATES

FOUNDRY RAPPING PLATES

ACME—See Everett & Son.

BENSKIN Mfg. Co., Canton, O. "Perfect."

CLEVELAND Galvanizing Works Co., Cleveland, O.

DIAMOND Clamp & Flask Co., Richmond, Ind.

EVERETT & Son, A., Auburn, N. Y. "Acme." "Fraser."

FRASER—See Everett & Son.

HILL & Griffith Co., Cincinnati, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. **(See page 521.)**

PERFECT—See Benskin Mfg. Co.

SHANAFELT Mfg. Co., Canton, O.

TIMMIS & Clissold, Bound Brook, N. J.

SCREW PLATES

(See Taps and Dies)

PLIERS

COMBINATION PLIERS

ATHOL Machine Co., Athol, Mass.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BERNARD—See Scholhorn Co.

BILLINGS & Spencer Co., Hartford, Conn. "Hayden."

BONNER Mfg. Co., C. E., Champaign, Ill. "Victor."

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

BUFFUM Tool Co., Louisiana, Mo.

CINCINNATI Tool Co., Norwood, O. "Hargrave."

CRESCENT Tool Co., Jamestown, N. Y. "Simplex." **(See page 489.)**

CRONK & Carrier Mfg. Co., Elmira, N. Y.

CURRIER-KOETH Mfg. Co., Coudersport, Pa. "K. I. T."

DANIELSON & Co., J. P., Jamestown, N. Y.

DUDLY Tool Co., Menominee, Mich.

ERIE Tool Works, Erie, Pa.

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IGNITION BATTERIES
LIGHTING BATTERIES
MIDGET BATTERIES

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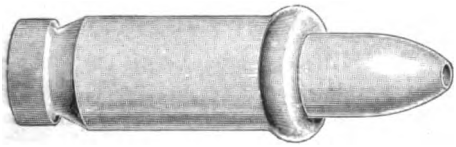

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TRENTON, NEW JERSEY

Freedom From Ignition Troubles

A Hot Spark Perfectly Timed—Simplest System of Wiring—One Coil for Any Number of Cylinders—Immediate Accessibility Without Tools—All are found in the model "D" distributer, the best system for marine or automobile use.

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Philadelphia Timer & Machine Company

Philadelphia Pennsylvania

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PLIERS (Continued)

COMBINATION PLIERS (Continued)

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HARGRAVE—See Cincinnati Tool Co.

HAYDEN—See Billings & Spencer Co.

HERBRAND Co., Fremont, O.

HJORTH & Co., Wm., Jamestown, N. Y.

IRVINGTON Mfg. Co., Irvington, N. J. "Red Devil."

K. I. T.—See Currier-Koeth Mfg. Co.

KILBORN & Bishop Co., New Haven, Conn.

KRAEUTER & Co., Newark, N. J.

McKAIG Drop Forge Co., Buffalo, N. Y.

OSWEGO Tool Co., Oswego, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

RED DEVIL—See Irvington Mfg. Co.

REDD Mfg. Co., Erie, Pa.

S. & I. Co., Springfield, Mass.

SCHOLHORN Co., Wm., New Haven, Conn. "Bernard."

SHARK—See Wakefield Mfg. Co.

SIMPLEX—See Crescent Tool Co.

STARRETT Co., L. S., Athol, Mass.

UNION—See Hall Co.

VICTOR—See Bonner Mfg. Co.

VLCHEK Tool Co., Cleveland, O.

WAKEFIELD Mfg. Co., Wakefield, Neb. "Shark."

WEST Haven Mfg. Co., New Haven, Conn.

WORDEN, E. M., Ladysmith, Wis.

WRIGHT Wrench & Forging Co., Canton, O.

GAS PLIERS

(See Pliers, Combination)

ELECTRIC PORTABLE POLISHERS

(See Drills, Electric Portable)

POSTS

TOOL POSTS

ARMSTRONG Bros. Tool Co., Chicago, Ill.

O. K. Tool Holder Co., Shelton, Conn.

PRESSES

ARBOR PRESSES

BARNES Co., W. F. & John, Rockford, Ill.

BARTLETT, Edwin E., Boston, Mass. "Greenerd."

CLEVELAND Machine Specialty Co., Toledo, O.

GEIER Co., P. A., Cleveland, O.

GREENERD—See Bartlett, Edwin E.

KING Machine Tool Co., Cincinnati, O.

LUCAS Macine Tool Co., Cleveland, O.

NILES-BEMENT-POND Co., New York, N. Y.

POST Garage & Repair Shop, Amos, Catskill, N. Y.

WILMARTH & Morman Co., Grand Rapids, Mich.

BENCH STRAIGHTENING PRESSES

CLEVELAND Machine Specialty Co., Toledo, O.

COREY—See Steel Specialties Co.

GEIER Co., P. A., Cleveland, O.

SPRINGFIELD Machine Tool Co., Springfield, O.

STEEL Specialties Co., Boston, Mass. "Corey."

BROACHING PRESSES

BLISS Co., E. W., Brooklyn, N. Y.

BURR & Sons, J. T., Brooklyn, N. Y.

CONSOLIDATED Press & Tool Co., Hastings, Mich. (See page 527.)

LAPOINTE Co., J. N., New London, Conn.

LAPOINTE Machine Tool Co., Hudson, Mass.

PERKINS Machine Co., Warren, Mass.

STANDARD Machinery Co., 7 Beverly St., Providence, R. I. (See page 469.)

WATSON-STILLMAN Co., New York, N. Y.

POWER PRESSES

ADRIANCE Machine Works, Brooklyn, N. Y.

AMS Machine Co., Max, Mt. Vernon, N. Y.

ATLAS Machine Co., Waterbury, Conn.

BLISS Co., E. W., Brooklyn, N. Y.

CADY Machine Co., Cleveland, O.

CLEVELAND Punch & Shear Works Co., Cleveland, O.

CONSOLIDATED Press & Tool Co., Hastings, Mich. (See page 527.)

COULTER & McKenzie Machine Co., Bridgeport, Conn.

FERRACUTE Machine Co., Bridgeton, N. J.

HIBBARD Mfg. Co., Wm. H., Brooklyn, N. Y.

LA SALLE Machine & Tool Co., La Salle, Ill.

LEFFLER & Co., Chas., Brooklyn, N. Y.

MANVILLE Machine Co., E. J., Waterbury, Conn.

MASSILLON Foundry & Machine Co., Massillon, O.

MICHIGAN Press Co., Ypsilanti, Mich.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PERKINS Machine Co., Warren, Mass.

ROCKFORD Iron Works, Rockford, Ill.

SPRINGFIELD Machine Tool Co., Springfield, O.

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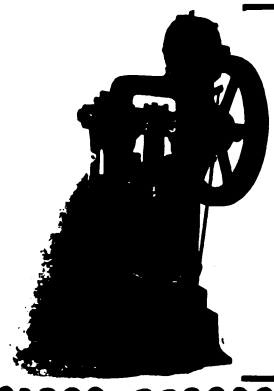

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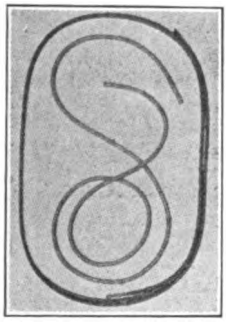

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PRESSES (Continued)

POWER PRESSES (Continued)

STANDARD Machinery Co., 7 Beverly St., Providence, R. I. (See page 469.)

STOLL Co., D. H., Buffalo, N. Y.

SWAINE Mfg. Co., Fred J., St. Louis, Mo.

TOLEDO Machine & Tool Co., Toledo, O.

V. & O. Press Co., Brooklyn, N. Y.

WATERBURY Farrell Foundry & Machine Co., Waterbury, Conn.

ZEH & Hahnemann Co., Newark, N. J.

PULLERS

COTTER PIN PULLERS

BONNER Mfg. Co., C. E., Champaign, Ill "Victor."

BRAUNSDORF-MUELLER Co., Elizabeth N. J.

BUFFUM Tool Co., Louisiana, Mo.

CARVER Tool Works, Spring Valley, N. Y.

ELMORE Tool Mfg. Co., Hartford, Conn.

KRAEUTER & Co., Newark, N. J.

MARCY Tool Works, Putnam, Conn.

MOSSBERG Co., Frank, Attleboro, Mass. (See page 557.)

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 355.)

NELSON Mfg. Co., A., Chicago, Ill.

NOONAN Tool & Machine Works, A. S., Rome, N. Y.

S. & I. Co., Springfield, Mass.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

VICTOR—See Bonner Mfg. Co.

VLCHEK Tool Co., Cleveland, O.

CRANK PIN OR FLYWHEEL PULLERS

CRANE Puller Co., Arlington, Mass.

KERSCHBAUM, M. E., New York, N. Y.

LITTLE Giant—See Premier Electric Co.

POLSON Mfg. Co., Buffalo. N. Y.

PREMIER Electric Co., Chicago, Ill. "Little Giant."

SCHWEPPE & Wilt, Detroit, Mich.

VULCAN—See Winchester Machine Works.

WINCHESTER Machine Works, Winchester, Ind. "Vulcan."

PUMPS

GARAGE PUMPS AND AIR COMPRESSORS

A. B. C.—See Artizan Brass Co.

ACME Machine Works, Findlay, O.

ALDING—See Cast Iron Brazing & Mfg. Co.

ALLIS-CHALMERS Mfg. Co., Milwaukee, Wis.

AMERICAN Air Compressor Co., Detroit, Mich.

AMERICAN Electric Air Pump Co., Pittsburg, Pa.

AMERICAN Steam Pump Co., Battle Creek. Mich.

ARTIZAN Brass Co., Chicago, Ill. "A. B. C."

AU-TO Compressor Co., Wilmington, O.

BASTIAN—See General Utility Co.

BESSEMER Gas Engine Co., Grove City, Pa.

BINKS—See Star Brass Works.

BISHOP-BABCOCK-BECKER Co., Cleveland, O. "Eureka." (See page 519.)

BLAISDELL Machine Co., Bradford, Pa.

BROWN Beer Pump Co., E. R., Boston, Mass. "Success."

BRUNNER Mfg. Co., Utica, N. Y. "Parker."

CALDWELL & Co., H. S., New York, N. Y.

CAST Iron Brazing & Mfg. Co., Manchester, N. H. "Alding."

CENTRAL Brass & Fixture Co., Springfield, O.

CHAMPION—See Cleveland Faucet Co.

CHICAGO Pneumatic Tool Co., Chicago, Ill.

CHRISTENSEN Engineering Co., Milwaukee, Wis.

CLAYTON—See International Steam Pump Co.

CLEVELAND Faucet Co., Cleveland, O. "Champion."

COMSTOCK, A. S., Evanston, Ill.

CURTIS & Co., Mfg. Co., St. Louis, Mo.

CYCLONE—See Judd & Leland Mfg. Co.

EUREKA—See Bishop-Babcock-Becker Co.

EUREKA — See Loppacker Auto Machine Works.

FAIRBANKS, Morse & Co., Chicago, Ill.

FT. WAYNE Engineering & Mfg. Co., Fort Wayne, Ind. "Paul."

GARDNER Governor Co., Quincy, Ill.

GEMMER-DETROIT Starter Co., Detroit, Mich.

GENERAL Electric Co., Schenectady, N. Y.

GENERAL Utility Co., Philadelphia, Pa. "Bastian."

GLEASON-PETERS Air Pump Co., Brooklyn, N. Y.

GLOBE Mfg. Co., Battle Creek, Mich.

GOULDS Mfg. Co., Seneca Falls, N. Y.

HALE-CHRISTY Co., Cleveland, O. (See page 465.)

HAYWARD Tire & Equipment Co., Indianapolis, Ind.

HERZ & Co., New York, N. Y. "Minimax." (See page 599.)

IMPERIAL—See Ingersoll-Rand Co.

INGERSOLL-RAND Co., New York, N. Y. "Imperial." (See page 529.)

INTERNATIONAL Steam Pump Co., New York, N. Y. "Clayton."

JACOBSON Machine Mfg. Co., Warren, Pa. (See page 531.)

JUDD & Leland Mfg. Co., Clifton Springs, N. Y. "Cyclone," "Juleco." (See pages 215 and 527.)

JULECO—See Judd & Leland Mfg. Co.

KELLOGG Mfg. Co., 3 Circle St., Rochester, N. Y. (See page 331.)

LIPMAN Mfg. Co., Beloit, Wis.

LITTLE GIANT—See Orange Machine & Mfg. Co.

LOPPACKER Auto Machine Works, Albert, Bloomfield, N. J. "Eureka."

MINIMAX—See Herz & Co.

NATIONAL Brake & Electric Co., Milwaukee, Wis.

O. B.—See Universal Mfg. Co.

ORANGE Machine & Mfg. Co., Orange, N. J. "Little Giant."

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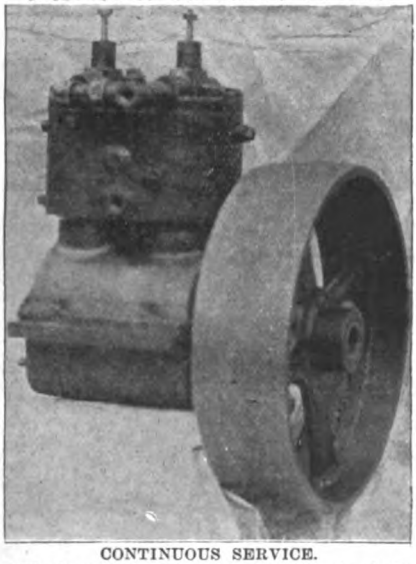
SPICER VERTICAL WATER-COOLED COMPRESSOR

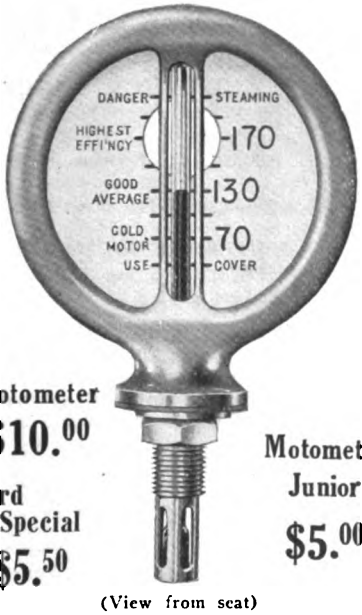


CONTINUOUS SERVICE.

The large water jacket allows a free circulation of cold water around the cylinders keeping them cool and assuring long life, and adapting the pump for continuous heavy service. Crank shaft is of steel two throw, running in extra large babbitted bearings. Pistons are packed with three large spring rings. Piston rods are of bronze.

Arranged for electrical drive to order.

SPICER MANUFACTURING CO., - GROTON, CONN.



Motometer $10.00

Ford Special $5.50

Motometer Junior $5.00

(View from seat)

Boyce Motometer attached to the radiator cap in 5 minutes

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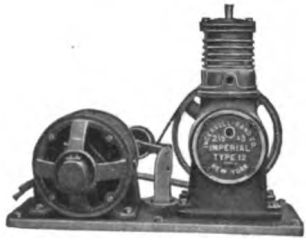
1790 BROADWAY, NEW YORK

"IMPERIAL" "Twelve" Garage Compressors



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PUMPS (Continued)

GARAGE PUMPS AND AIR COMPRESSORS (Continued)

OWEN Air Compressor Works, N. E., Springfield, O.

PARKER—See Brunner Mfg. Co.

PAUL—See Ft. Wayne Engineering & Mfg. Co.

PEERLESS Accessories Manufacturers, Chicago, Ill.

PHILADELPHIA Timer & Machine Co., Philadelphia, Pa. (See page 525.)

ROHRBACHER Automatic Air Pump Co., Portland, Ore.

SARGENT Steam Meter Co., Chicago, Ill.

SCHAEFER-FRENZEL Co., Detroit, Mich.

SPACKE Machine Co., F. W., Indianapolis, Ind. (See page 305.)

SPICER Mfg. Co., Groton, Conn. (See page 529.)

STANDARD Pattern & Mfg. Co., Richmond, Ind.

STAR Brass Works, Chicago, Ill. "Binks."

SUCCESS—See Brown Beer Pump Co.

SUPERIOR Machine & Engineering Co., Detroit, Mich. "Yale."

TEN Eyck Pump Co., Auburn, N. Y.

UNION Steam Pump Co., Battle Creek, Mich.

UNIVERSAL Mfg. Co., Minneapolis, Minn. "O. B."

VICTOR Electric Co., Chicago, Ill.

WESTINGHOUSE Air Brake Co., Pittsburg, Pa.

YALE—See Superior Machine & Engineering Co.

PUNCHES

PUNCHES AND SHEARS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

BICKNELL Mfg. & Supply Co., Janesville, Wis.

BLISS Co., E. W., Brooklyn, N. Y.

BUFFALO Forge Co., Buffalo, N. Y.

CANEDY-OTTO Mfg. Co., Chicago Heights, Ill.

CLARK Foundry Co., Rumford, Me.

CLEVELAND Punch & Shear Works Co., Cleveland, O.

CLOUGH, R. M., Tolland, Conn

EXCELSIOR Tool & Machine Co., East St. Louis, Ill. "X L C R."

FERRACUTE Machine Co., Bridgeton, N. J.

HUNTINGTON Machine & Foundry Co., Huntington, Ind.

KANE & Roach, Syracuse, N. Y.

LITTLE Giant Punch & Shear Co., Sparta, Ill.

LONG & Allstatter Co., Hamilton, O.

MASSILLON Foundry & Machine Co., Massillon, O.

MITTS & Merrill, Saginaw, Mich.

MOLINE—See Williams, White & Co.

NEW Doty Mfg. Co., Janesville, Wis.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

PELS & Co., Henry, New York, N. Y.

PERKINS Machine Co., Warren, Mass.

QUICKWORK—See Smith, H. Collier.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

ROCK River Machine Co., Janesville, Wis.

ROYERSFORD Foundry & Machine Co., Royersford, Pa.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

SMITH, H. Collier, Detroit, Mich. "Quickwork."

STOLL Co., D. H., Buffalo, N. Y.

TOLEDO Machine & Tool Co., Toledo, O.

UNION Mfg. Co., New Britain, Conn.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WHITING Co., Geo., Chicago, Ill.

WILLIAMS, White & Co., Moline, Ill. "Moline."

X L C R—See Excelsior Tool & Machine Co.

ARCH AND WASHER PUNCHES

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

CENTER AND PRICK PUNCHES

BEALL Bros., Alton, Ill.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

BROWNE & Dowd Mfg. Co., Meriden, Conn.

CARVER Tool Works, Spring Valley, N. Y.

CINCINNATI Tool Co., Norwood O., "Hargrave."

CRONK & Carrier Mfg. Co., Elmira, N. Y.

DEUSE, J. S., Chester, Conn.

ELMORE Tool Mfg. Co., Hartford, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVE—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

KEYSTONE Mfg. Co., Buffalo, N. Y.

KRAEUTER & Co., Newark, N. J.

LOWENTRAUT Mfg. Co., P., Newark, N. J.

MARCY Tool Works, Putnam, Conn.

MAYHEW Co., H. H., Shelburne Falls, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

S. & I. Co., Springfield, Mass.

STARRETT Co., L. S., Athol, Mass.

STORTZ & Son, John, Philadelphia, Pa.

SYRACUSE Twist Drill Co., Syracuse, N. Y.

TUCK Mfg. Co., Brockton, Mass.

WEST Haven Mfg. Co., New Haven, Conn.

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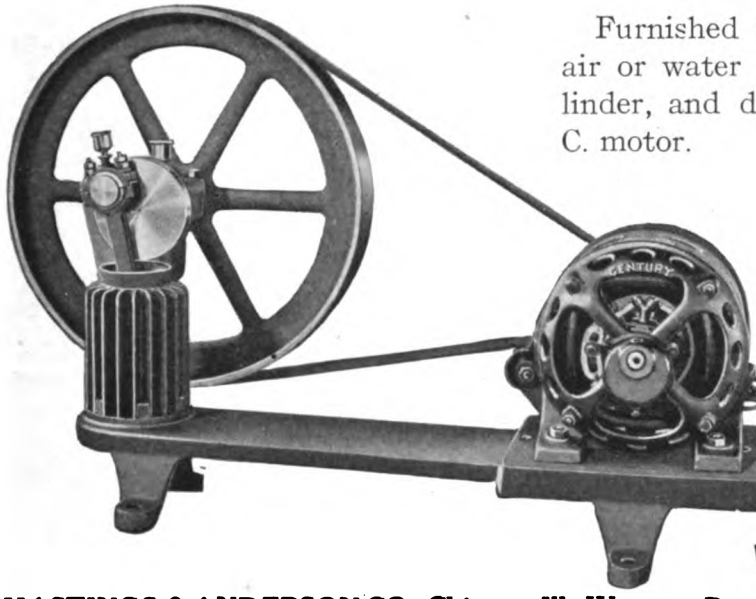
Jacobson Garage Compressor

(MOTOR DRIVEN TYPE)



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Warren, Pa.

HASTINGS & ANDERSON CO., Chicago, Ill., Western Representatives

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Cost less than a GOOD built-up shaft.
Once right, always right—no cams to work loose.
OURS ARE RIGHT—cams thoroughly hardened and shaft mechanically perfect.

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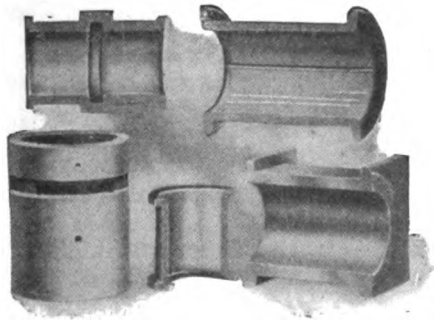

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By our method, we produce a very dense casting with smooth surface, accurate and uniform in every respect. Estimates furnished.

American Die Casting Company
Vandalia Tracks and White River, Indianapolis, Ind.

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PUNCHES (Continued)

PORTABLE HAND PUNCHES

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

BUFFALO Forge Co., Buffalo, N. Y.

CLOUGH, R. M., Tolland, Conn.

EVANSVILLE Tool Works, Evansville, Ind.

EXCELSIOR Tool & Machine Co., East St. Louis, Ill. "Little Giant."

HUNTINGTON Machine & Foundry Co., Huntington, Ind.

KIDDER Mfg. Co., J. F., Burlington, Vt.

LITTLE GIANT—See Excelsior Tool & Machine Co.

LITTLE Giant Punch & Shear Co., Sparta, Ill.

MARVEL—See Armstrong-Blum Mfg. Co.

PELS & Co., Henry, New York, N. Y.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

WHITNEY Mfg. Co., W. A., Rockford, Ill.

PRICK PUNCHES

(See Punches, Center and Prick)

WASHER PUNCHES

(See Punches, Arch and Washer)

PYROMETERS

ADVANCE—See Wilson-Maeulen Co.

BRISTOL Co., Waterbury, Conn.

BROWN Instrument Co., Philadelphia, Pa.

DU Vivier, Ernest H., New York, N. Y. (Importer.)

ESTERLINE Co., Indianapolis, Ind.

HANOVIA Chemical & Mfg. Co., Newark, N.J.

HOSKINS Mfg. Co., Detroit, Mich.

KEYSTONE Electrical Instrument Co., Philadelphia, Pa.

LE CHATELIER—See Wilson-Maeulen Co.

LEEDS & Northrup Co., Philadelphia, Pa.

QUEEN-GRAY Co., Philadelphia, Pa.

SCHAEFFER & Budenberg Mfg. Co., Brooklyn, N. Y.

SHORE Instrument & Mfg. Co., New York, N. Y.

TAYLOR Instrument Cos., Rochester, N. Y. "Tycos."

THWING Instrument Co., Philadelphia, Pa.

TYCOS—See Taylor Instrument Cos.

UNIPIVOT—See Wilson-Maeulen Co.

WILSON-MAEULEN Co., New York, N. Y. "Advance," "Le Chatelier," "Unipivot."

ZAUBITZ, August, New York, N. Y.

RACKS

DRILL RACKS

DRIVER, C. H., Racine, Wis.

METAL TOOL AND STOCK RACKS

BERGER Mfg. Co., Canton, O.

CLARK Co., W. J., Salem, O.

CLEVELAND Wire Spring Co., Cleveland, O

DARBY & Sons Co., Edward, Philadelphia, Pa.

DURAND-STEEL Locker Co., Chicago, Ill.

FEDERAL Steel Fixture Co., Chicago, Ill.

HETTS Co., Detroit, Mich.

LYON Metallic Mfg. Co., Aurora, Ill.

MANUFACTURING, Equipment & Engineering Co., Boston, Mass.

MERRITT & Co., Camden, N. J.

NEW Britain Machine Co., New Britain, Conn.

OHIO Mfg. Co., Painesville, O. (See page 465.)

TERRELL'S Equipment Co., Grand Rapids, Mich.

VAN Dorn Iron Works, Cleveland, O.

WESTERN Tool & Mfg. Co., Springfield, O.

REAMERS

STANDARD AND ADJUSTABLE REAMERS

ACME—See Schellenbach-Hunt Tool Co.

AMERICAN Tap & Die Co., Greenfield, Mass. (See page 549.)

BILLINGS & Spencer Co., Hartford, Conn.

BRUBAKER & Bros., W. L., Millersburg, Pa

BUTTERFIELD & Co., Derby Line, Vt

CELFOR Tool Co., Buchanan, Mich.

CHADWICK & Trefethan, Portsmouth, N. H. "Critchley."

CLEVELAND Twist Drill Co., Cleveland, O. "Paradox," "Peerless." (See pages 487 and 533.)

CLOUGH, R. M., Tolland, Conn.

CRITCHLEY—See Chadwick & Trefethan.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 489.)

DIAMOND—See Whitman & Barnes Mfg. Co.

GISHOLT Machine Co., Madison, Wis.

GRANT Nail & Supply Co., Boston, Mass. "Turney."

GREEN RIVER—See Wiley & Russell Mfg. Co.

HERCULES—See Wells & Son Co.

KELLY Reamer Co., Cleveland, O.

LAPOINTE Machine Tool Co., Hudson, Mass.

LIGHTNING—See Wiley & Russell Mfg. Co.

LINCOLN-WILLIAMS Twist Drill Co., Taunton, Mass.

LITTLE GIANT—See Wells Bros. Co.

McCROSKY Reamer Co., Meadville, Pa.

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have blades of specially selected high speed steel solidly joined to a soft steel body—can be run at double the speed of carbon steel reamers and will ream two or three times as many holes without regrinding—cost you only half as much as other solid high speed reamers.

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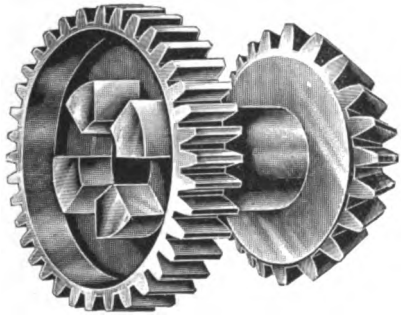
New York CLEVELAND Chicago



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REAMERS (Continued)

STANDARD AND ADJUSTABLE REAMERS (Continued)

MORSE Twist Drill & Machine Co., New Bedford, Mass.

NATIONAL Twist Drill & Tool Co., Detroit, Mich.

OHIO Reamer Co., Cleveland, O.

ONE Lock Reamer Co., New Haven, Conn.

PARADOX—See Cleveland Twist Drill Co.

PEERLESS—See Cleveland Twist Drill Co.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

ROGERS Works, John M., Gloucester City, N. J.

S. M. P.—See Screw Machine Products Corp.

SCHELLENBACH-HUNT Tool Co., Cincinnati, O. "Acme."

SCREW Machine Products Corp., Providence, R. I. "S. M. P."

STANDARD Tool Co., Cleveland, O.

STAPF & Co., John B., Dunkirk, N. Y.

TURNEY—See Grant Nail & Supply Co.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

WELLS & Son Co., F. E., Greenfield, Mass. "Hercules."

WHITMAN & Barnes Mfg. Co., Akron, O. "Diamond."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning," "Green River." (See page 545.)

REGISTERS

AUTOGRAPHIC AND MANIFOLD REGISTERS

AMERICAN Sales Book Co., Elmira, N. Y.

AUTOGRAPHIC Register Co., Hoboken, N. J. "Shouperior."

EGRY Register Co., Dayton, O.

McCASKEY Register Co., Alliance, O.

SHOUPERIOR—See Autographic Register Co.

RIDDLES

FOUNDRY RIDDLES AND SIEVES

BUFFALO Wire Works Co., Buffalo, N. Y.

DARBY & Sons Co., Edward, Philadelphia, Pa.

DEAN & Co., Henry E., Worcester, Mass.

TAYLOR & Dean, Pittsburg, Pa.

TYLER Co., W. S., Cleveland, O.

WRIGHT Wire Co., Worcester, Mass.

ROLLS

BENDING AND STRAIGHTENING ROLLS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

HUNTINGTON Machine & Foundry Co., Huntington, Ind.

KANE & Roach, Syracuse, N. Y.

NEW Doty Mfg. Co., Janesville, Wis.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

NILES-BEMENT-POND Co., New York, N. Y.

PERKINS Machine Co., Warren, Mass.

PETTINGELL Machine Co., Amesbury, Mass.

ROCK River Machine Co., Janesville, Wis.

TOLEDO Machine & Tool Co., Toledo, O.

WHITCOMB-BLAISDELL Machine Tool Co., Worcester, Mass.

WHITING Co., Geo., Chicago, Ill.

RULES

STEEL RULES

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

KEUFFEL & Esser Co., Hoboken, N. J.

LUFKIN Rule Co., Saginaw, Mich.

STANLEY Rule & Level Co., New Britain, Conn.

STARRETT Co., L. S., Athol, Mass.

WYKE, J., Wilmington, Mass.

SANDERS

WOOD SANDERS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Works, Beloit, Wis.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

DEFIANCE Machine Works, Defiance, O.

DRIVER, C. H., Racine, Wis.

FAY & Egan Co., J. A., Cincinnati, O.

JONES Superior Machine Co., Chicago, Ill.

KANE & Roach, Syracuse, N. Y.

OBER Mfg. Co., Chagrin Falls, O.

OLIVER Machinery Co., Grand Rapids, Mich.

PRYIBIL, P., New York, N. Y.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

WYSONG & Miles Co., Greensboro, N. C.

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EAST INDIA PLUMBAGO,
POLISHERS' AND PLATERS' COMPOSITIONS,
Spanish Felt Wheels,
Cotton Buffs,
Etc.

HIGH QUALITY **PERSONAL SERVICE**

I MANUFACTURE

FOUNDRY FACINGS **FOUNDRY SUPPLIES**

RUFFING COMPOSITIONS **DYNAMOS**

PLATERS' SUPPLIES

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Your factory troubles vanish before my facings.

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Detroit, Michigan

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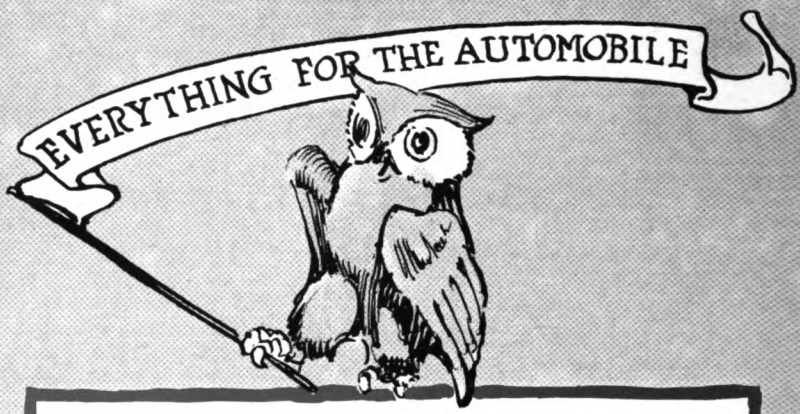

There is a mighty big satisfaction in knowing that there's a live wire at the other end of your business connection—and that no matter what you may need you can get it **instantly.**

The automobile foundry and electroplating departments need never be kept waiting; I can get goods to you as quick as it is humanly possible.

I manufacture foundry facings, foundry supplies, buffing compositions and other equipment and carry a large warehouse completely stocked with everything for your needs.

Whether you want equipment for an entire plant or for one corner of it—**I've got the goods**. Can also supply an expert operator to put a plant in motion.

Now, I want more business; you want better service. Let's get together.

Why travel in a funeral procession when you can march in a parade?

Write me.

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Detroit, Michigan

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Automobile Axles *of* Known Quality

We Have Open Capacity for 1914 and are in position to handle contracts for the highest grade pleasure car axles for both gas cars and electrics.

Our pressed steel housing type rears are light in weight, unusually rigid and silent.

We are fully equipped to build to your specifications or furnish standard type. Materials and Workmanship fully guaranteed. Deliveries as you want them, assured. Write us before placing your contract.

Metal Products Company
Detroit, Michigan

Detroit Slip Cover Co.

1225 Woodward Avenue
Detroit Michigan

—Just—

Automobile Slip Covers
Dust Covers
Radiator Covers

Cravenettes, New Motor Cloths, Whipcords and Linens in stock.

We have recently PATENTED a device which we absolutely guarantee to prevent back-firing and save you from 25 to 50 per cent on your gasolene bill. Save you 5 to 10 per cent wear and tear on the motor. Start your motor easier in cold weather. Increase the power of your motor 10 to 20 per cent. Prevent the motor from choking up and jerking when a quick-get-away is necessary. Eliminate the constant necessity of adjusting and repairing the motor, scraping carbon deposits from the cylinders, &c., and thus reduce running expenses to a minimum.

The device is designed by the J. von Waldy engineering laboratories.

Is made in standard sizes, can be attached to any motor in 10 minutes. No machinery to get out of order. Price $5. Given on trial. If not as represented money refunded. Write for particulars.

GAS SAVING & BACK-FIRE PREVENTER CO.,

Phone Gramercy 6678
125 East 23d St., New York

The Gas Saving and Back-fire Preventer Device designed by J. von Waldy, Mech. Eng.

The device is made of an 18 gauge copper retainer, turned and spun on a lathe into a double form. Two layers of wire gauze are spun into the copper retainer to make the device durable. Between the two layers of gauze, which have a dome shape, is securely installed a vaporizer made of a special material (patented), which vaporizes gasolene, uniformly, to 100% efficiency.

IMPERIAL BEARING COMPANY

Detroit, Mich.

Makers of High Grade and

Absolutely Silent Ball Bearings

Plain Radial

100% Radio Thrust

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SAWS

BAND SAWING MACHINES

AMERICAN Saw Mill Machinery Co., New York, N. Y.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Works, Beloit, Wis.

CORDESMAN, Meyer & Co., Cincinnati O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GOODSPEED Machine Co., Winchendon, Mass.

GREAVES, Kulsman & Co., Cincinnati, O.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

HILES & Co., C. A., Chicago, Ill.

JONES Superior Machine Co., Chicago, Ill.

KANE & Roach, Syracuse, N. Y.

MARSTON & Co., J. M., Boston, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL, P., New York, N. Y.

ROOT Co., B. M., York, Pa.

SILVER Mfg. Co., Salem, O.

SMITH Machine Co., H. B., Smithville, N. J.

WEST Side Iron Works, Grand Rapids, Mich.

CIRCULAR SAW TABLES

AMERICAN Saw Mill Machinery Co., New York, N. Y.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BAKER Bros., Toledo, O.

BEACH Mfg. Co., Montrose, Pa.

BENTEL & Margendant Co., Hamilton, O.

CORDESMAN, Meyer & Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Kulsman & Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

GRIMM Mfg. Co., Buffalo, N. Y.

MARSTON & Co., J. M., Boston, Mass.

OLIVER Machinery Co., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL, P., New York, N. Y.

ROOT Co., B. M., York, Pa.

SMITH Machine Co., H. B., Smithville, N. J.

COLD SAW CUTTING-OFF MACHINES

AMERICAN Die & Tool Co., Reading, Pa.

BILLINGS & Spencer Co., Hartford, Conn.

BURKE Machine Tool Co., Conneaut, O.

BURR & Sons, John T., Brooklyn, N. Y.

COCHRANE-BLY Co., Rochester, N. Y.

ESPEN-LUCAS Machine Works, Philadelphia, Pa.

HIGLEY Machine Co., New York, N. Y.

LEA Equipment Co., Philadelphia, Pa. "Lea-Simplex."

LEA-SIMPLEX—See Lea Equipment Co.

MOTOR Parts Co., Plainfield, N. J.

NUTTER & Barnes Co., Hinsdale, N. H.

TINDEL-MORRIS Co., Eddystone, Pa.

HAND SAWS

(Rip and Cross Cut)

ATKINS & Co., E. C., Indianapolis, Ind.

BISHOP & Co., Geo. H. Lawrenceburg, Ind. "Greyhound."

CENTRAL Hardware Co., Philadelphia, Pa.

DISSTON & Sons, Henry, Philadelphia, Pa.

GREYHOUND—See Bishop & Co.

JENNINGS & Co., C. E., New York, N. Y.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

PENNSYLVANIA Saw Co., Philadelphia, Pa.

SIMONDS Mfg. Co., Fitchburg, Mass.

POWER HACK SAWS

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

ATKINS & Co., E. C., Indianapolis, Ind. "Kwik-Kut."

BUFFALO Specialty Co., Buffalo, N. Y. "Duplex."

DAYTON Machine Works, Dayton, O. "Victor."

DIAMOND Saw & Stamping Works, Buffalo, N. Y. "Sterling."

DUPLEX—See Buffalo Specialty Co.

FRONTIER Iron Works, Buffalo, N. Y. "Robertsons Royal."

GOODELL-PRATT Co., Greenfield, Mass.

HOEFER Mfg. Co., Freeport, Ill.

KWIK-KUT—See Atkins & Co.

MARVEL—See Armstrong-Blum Mfg. Co.

MASSACHUSETTS Saw Works, Springfield, Mass.

MILLERS Falls Co., New York, N. Y.

MOTOR Parts Co., Plainfield, N. J.

NORTH Wales Machine Co., North Wales, Pa.

OLMSTED'S Son, L. H., Hasbrouck Heights, N. J.

RACINE Tool & Machine Co., Racine, Wis.

ROBERTSON Machine & Foundry Co., Buffalo, N. Y.

ROBERTSONS ROYAL—See Frontier Iron Works.

STAR—See Miller's Falls Co.

STERLING—See Diamond Saw & Stamping Works.

STORY, H. T., Chicago, Ill.

THOMPSON & Son Co., Henry G., New Haven, Conn.

UNIVERSAL—See West Haven Mfg. Co.

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High Grade Automobile Cylinder Castings

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EIGHT-DAY AUTO CLOCK WITH FIFTEEN JEWELS

The ETERNA eight day auto clock is the product of a foreign manufacturer whose fame as a producer of high-class timepieces is world-wide. Its fifteen jewelled movement of the finest construction, guarantees absolute reliability, and perfect timekeeping under the severest service of motoring.

By means of its heavy felt interlining, between the inside and outside cases, it is unaffected by the sharpest vibrations. Its double case and two convex glasses make it dust and waterproof. An 8-day movement stem wind, and stem set. Fastens to the dashboard from the inside of the case.

It is by all odds the most reliable automobile clock on the market, and dealers will find it a wonderful seller. Price, $20 net.

Special proposition to one or two dealers in each town. Write for our agency offer.

ERNEST C. MEYER

822 Citizens Building

CLEVELAND, O.

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SAWS (Continued)

POWER HACK SAWS (Continued)

VICTOR—See Dayton Machine Works.

WESTERN Tool & Mfg. Co., Springfield, O.

WEST Haven Mfg. Co., New Haven, Conn. "Universal."

SWING SAWS

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BADGER State Machine Co., Janesville, Wis.

BERLIN Machine Works, Beloit, Wis.

CONNELL & Dengler Machine Co., Rochester, N. Y.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

FOX Machine Co., Grand Rapids, Mich.

GREAVES, Klusman & Co., Cincinnati, O.

GREENLEE Bros. & Co., Rockford, Ill.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

JONES Superior Machine Co., Chicago, Ill.

KANE & Roach, Syracuse, N. Y.

OLIVER Machinery Co., Grand Rapids, Mich.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

ROOT Co., B. M., York, Pa.

SILVER Mfg. Co., Salem, O.

SMITH Machine Co., H. B., Smithville, N. J.

HOT SAWS

BILLINGS & Spencer Co., Hartford, Conn.

HILES & Co., C. A., Chicago, Ill.

LEWIS Foundry & Machine Co., Pittsburg, Pa.

INSERTED TOOTH SAWS

BARRY Saw Co., Indianapolis, Ind.

BUCKEYE Saw Mfg. Co., Columbus, O.

DISSTON & Sons, Henry, Philadelphia, Pa. "Premier."

HUNTER Saw & Machine Co., Pittsburg, Pa.

OHLEN & Sons Saw Mfg. Co., James, Columbus, O.

PREMIER—See Disston & Sons.

SIMONDS Mfg. Co., Fitchburg, Mass.

TABOR Mfg. Co., Philadelphia, Pa. "Taylor-Newbold."

TAYLOR-NEWBOLD—See Tabor Mfg. Co.

TINDEL-MORRIS Co., Eddystone, Pa.

SCRAPERS

BEARING SCRAPERS

ALERT Tool Co., Philadelphia, Pa.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BUFFUM Tool Co., Louisiana, Mo.

HAYES File Co., Detroit, Mich.

KRAEUTER & Co., Newark, N. J.

LUTZ—See Western Tool & Mfg. Co.

MARCY Tool Works, Putnam, Conn.

MOUND Tool Co., Seventh & Hickory Sts., St. Louis, Mo. (See page 355.)

VLCHEK Tool Co., Cleveland, O.

WESTERN Tool & Mfg. Co., Springfield, O. "Lutz."

SCRIBERS

MACHINISTS SCRIBERS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

JOHNSON, Wm., Newark, N. J.

STARRETT Co., L. S., Athol, Mass.

WEST Haven Mfg. Co., New Haven, Conn.

SEPARATORS

AIR SEPARATORS

PANGBORN Corp., Hagerstown, Md.

OIL SEPARATORS

AMERICAN Tool & Machine Co., Boston, Mass. "Roper." (See page 541.)

ROPER—See American Tool & Machine Co.

SETS

RIVET SETS

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

CARVER Tool Works, Spring Valley, N. Y

DREW & Co., C., Kingston, N. Y.

JOHNSON, Wm., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

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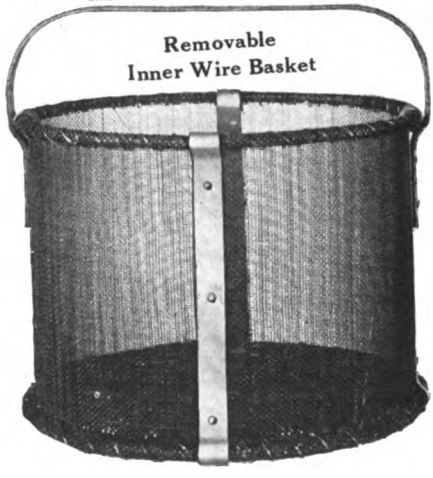
"Weston" Centrifugal Dryer

With
Straight
Basket
and
Inner
Wire
Basket
for
Drying Out
Coated
Dipped
Japanned
Painted
Plated
or
Washed
Pieces



Saves
Room, Time, Labor, Expense
An
Efficiency Machine
Of
Standard Construction

The American Tool & Machine Co.

Incorporated 1864 BOSTON

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SETS (Continued)

RIVET SETS (Continued)

LOWENTRAUT Mfg. Co., P., Newark, N. J.

PECK, Stow & Wilcox Co., Southington, Conn.

VAN DOREN Mfg. Co., Chicago Heights, Ill. "Vandor."

VANDOR—See Van Doren Mfg. Co.

VAUGHAN & Bushnell Mfg. Co., Chicago, Ill.

SHAPERS

METAL SHAPERS

AMERICAN Tool Works Co., Cincinnati, O.

BOYNTON & Plummer, Worcester, Mass.

CINCINNATI Shaper Co., Cincinnati, O.

FLATHER Planer & Shaper Co., Nashua, N. H.

GOULD & Eberhardt, Newark, N. J.

HENDEY Machine Co., Torrington, Conn.

JUENGST & Sons, Geo., Croton Falls, N. Y.

KELLY Co., R. A., Xenia, O.

LUTTER & Gies Co., Milwaukee, Wis. "Milwaukee."

MILWAUKEE—See Lutter & Gies.

NILES-BEMENT-POND Co., New York, N. Y.

OHIO Machine Tool Co., Kenton, O.

POTTER & Johnston Machine Co., Pawtucket, R. I.

QUEEN City Machine Tool Co., Cincinnati, O.

ROCKFORD Machine Tool Co., Rockford, Ill.

SMITH & Mills Co., Cincinnati, O.

SPRINGFIELD Machine Tool Co., Springfield, O.

STAPF & Co., John B., Dunkirk, N. Y.

STEPTOE Shaper Co., John, Cincinnati, O.

STOCKBRIDGE Machine Co., Worcester, Mass.

WALCOTT & Wood Machine Tool Co., Jackson, Mich.

WOOD SHAPERS

ADVANCE Machinery Co., Toledo, O.

AMERICAN Woodworking Machinery Co., Rochester, N. Y.

BARKER & Co., Wm., Covington, Ky.

BENTEL & Margendant Co., Hamilton, O.

BERLIN Machine Works, Beloit, Wis.

CORDESMAN, Meyer & Co., Cincinnati, O.

CORDESMAN-RECHTIN Co., Cincinnati, O.

CRESCENT Machine Co., Leetonia, O.

DEFIANCE Machine Works, Defiance, O.

FAY & Egan Co., J. A., Cincinnati, O.

HALL & Brown Woodworking Machine Co., St. Louis, Mo.

JONES Superior Machine Co., Chicago, Ill.

PORTER Machinery Co., C. O., Grand Rapids, Mich.

POWER & Co., L., Philadelphia, Pa.

PRYIBIL, P., New York, N. Y.

SMITH Machine Co., H. B., Smithville, N. J.

WHITNEY & Son, Baxter D., Winchendon, Mass.

SHARPENERS

FILE SHARPENERS

AMERICAN File Sharpener Co., Brooklyn, N. Y.

SHAVES

SPOKE SHAVES

CINCINNATI Tool Co., Norwood, O. "Hargrave."

GOODELL-PRATT Co., Greenfield, Mass.

HARGRAVE—See Cincinnati Tool Co.

JOHNSON, Wm., Newark, N. J.

OHIO Tool Co., Columbus, O.

STANLEY Rule & Level Co., New Britain Conn.

WHITE Co., L. & I. J., Buffalo, N. Y.

SHEARS

LEVER SHEARS

BADGER State Machine Co., Janesville, Wis.

BERTSCH & Co., Cambridge City, Ind.

BICKNELL Mfg. & Supply Co., Janesville, Wis.

EDWARDS, C. D., Albert Lea, Minn.

FARREL Foundry & Machine Co., Ansonia, Conn.

NIAGARA Machine & Tool Works, Buffalo, N. Y.

PECK, Stow & Wilcox Co., Southington, Conn.

ROBINSON Mfg. Co., J. M., Cincinnati, O.

SCHATZ Mfg. Co., Poughkeepsie, N. Y.

WATERBURY Farrel Foundry & Machine Co., Waterbury, Conn.

SHOVELS

MOLDERS SHOVELS

AMES & Sons Corp., Oliver, North Easton, Mass.

BEALL Bros., Alton, Ill.

HUBBARD & Co., Pittsburg, Pa.

PFEIFER & Co., John, Philadelphia, Pa.

PITTSBURG Shovel Co., Pittsburg, Pa.

WOOD Shovel & Tool Co., Piqua, O.

WYOMING Shovel Works, Wyoming, Pa.

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33 Car Makers Use Tanner Gauge

After the most searching tests, 33 of America's leading car makers have adopted the Tanner Gasoline Tank Gauges. That best proves its superiority. That's its best endorsement.

Some of the 33 makers using Tanner are:

Peerless	Abbott	Hudson
McFarlan	Nyberg	Winton
Haynes	Mitchell-	Chevrolet
Staver	Lewis	S. G. V.
Case	Keeton	Imperial
Stearns	Crow	Kissel
Stutz	Velie	Chalmers
Garford	Pathfinder	Westcott
Jeffery	Alco	Lewis

The Tanner Gauge is perfectly simple in construction. Nothing to get out of order or wear out.

A type for every car. Special gauges made to specifications.

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Akron, O.

WADE MFG. CO.
ESTABLISHED 1862

Manufacturers of

For Cushions, Backs and Tops OF AUTOMOBILES AND CARRIAGES

Made in Genuine or Imitation Leather

REASONABLE PRICES
PROMPT SHIPMENTS

Our customers include the leading car and carriage manufacturers throughout the country.

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BROCKTON - MASSACHUSETTS

THE LITTLE STEERSMAN

Takes away all nervous strain and most all of the physical labor of steering.

A WONDERFUL SAFEGUARD TO THE MOTORIST AND HIS CAR. EASILY ATTACHED TO ANY CAR.

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Modern Auto Appliance Co.
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NARCO
TIRE CUT FILLER

The Motorist's Self-Vulcanizer

fills the cuts and holes, solidifies quickly and becomes like a part of the tire. Easy to use—clean cut, fill with Narco T. C. F., allow to stand over night: result—a new tire.

Very Large Tube $1.00—$1.50 in Canada

NATIONAL RUBBER COMPANY
4409 Papin St. St. Louis, Mo.

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SLOTTERS

SCREW SLOTTERS

DAVIS Sewing Machine Co., Dayton, O.

GARVIN Machine Co., New York, N. Y.

MANVILLE Machine Co., E. J., Waterbury, Conn.

NATIONAL-ACME Mfg. Co., Cleveland, O. (See page 359.)

SNIPS

METAL SNIPS OR SHEARS

ACME Shear Co., Bridgeport, Conn. "Ajax," "Star."

AJAX—See Acme Shear Co.

BARTLETT Mfg. Co., Detroit, Mich.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

CLAUSS Shear Co., Fremont, O.

DUDLY Tool Co., Menominee, Mich.

HEINISCH'S Sons Co., R., Newark, N. J.

KRAEUTER & Co., Newark, N. J.

NATIONAL Cutlery Co., Philadelphia, Pa.

PECK, Stow & Wilcox Co., Southington, Conn.

STAR—See Acme Shear Co.

STORTZ & Son, John, Philadelphia, Pa.

WISS & Sons Co., J., Newark, N. J.

SOLDER

ALUMINUM SOLDER

ACME—See Universal Fluxine Co.

ALUMALUX Co., Sidney, O.

ARROW—See Lester Co.

ATKINSON Co., Rochester, N. Y. (See page 271.)

CITY Brass Foundry Co., Cleveland, O.

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y. (See page 507.)

GOTHAM Aluminum Solder Co., New York, N. Y.

ILLINOIS Smelting & Refining Co., Chicago, Ill.

JANNEY, Steinmetz & Co., Philadelphia, Pa. "Richards." (See page 411.)

LANGSENKAMP, F. H., Indianapolis, Ind.

LESTER Co., Fayetteville, N. Y. "Arrow."

LUMEN Bearing Co., Buffalo, N. Y. (See page 321.)

MINCER, E. N., Chicago, Ill.

MORE-JONES Brass & Metal Co., St. Louis, Mo.

NATIONAL Products Co., Kokomo, Ind.

RICHARDS—See Janney, Steinmetz & Co.

RICHARDS & Co., Boston, Mass.

THWING, C. B., Philadelphia, Pa.

U. S. Reduction Co., Chicago, Ill. "W. H. F."

UNITED Foundry & Machine Co., Bridgeport, Conn. (See page 341.)

UNIVERSAL Fluxine Co., Urbana, O. "Acme."

W. H. F.—See U. S. Reduction Co.

HALF AND HALF SOLDER

BIRKENSTEIN & Sons, S., 387-99 W. Ontario St., Chicago, Ill. (See page 515.)

BLATCHFORD Co., E. W., Chicago, Ill.

COLUMBIA Smelting & Refining Works, Brooklyn, N. Y.

EMPIRE Metal Co., Syracuse, N. Y.

GARDINER Metal Co., Chicago, Ill.

HOYT Metal Co., 700 Merchants-Laclede Bldg., St. Louis, Mo. (See page 271.)

KAHN Bros., Brooklyn, N. Y.

LEHMAN Bros., Hoboken, N. J.

LISSBERGER & Son, Marks, Long Island City, N. Y.

LUMEN Bearing Co., Buffalo, N. Y. (See page 321.)

MERCHANT & Evans Co., Philadelphia, Pa. (See page 135.)

MORE-JONES Brass & Metal Co., St. Louis, Mo.

NATIONAL Lead Co., New York, N. Y. (See page 291.)

TAYLOR Co., N. & G., Philadelphia, Pa.

U. S. Reduction Co., Chicago, Ill.

SQUARES

MACHINISTS SQUARES

ATHOL Machine Co., Athol, Mass.

BROWN & Sharpe Mfg. Co., Providence, R. I.

GOODELL-PRATT Co., Greenfield, Mass.

STARRETT Co., L. S., Athol, Mass.

STAMPS

STEEL STAMPS

(For Numbering or Lettering Parts)

BALZER Co., Gus., New York, N. Y.

CHANDLER Co., Springfield, Mass.

EVERETT & Son, A., Auburn, N. Y.

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A FORD SPECIAL

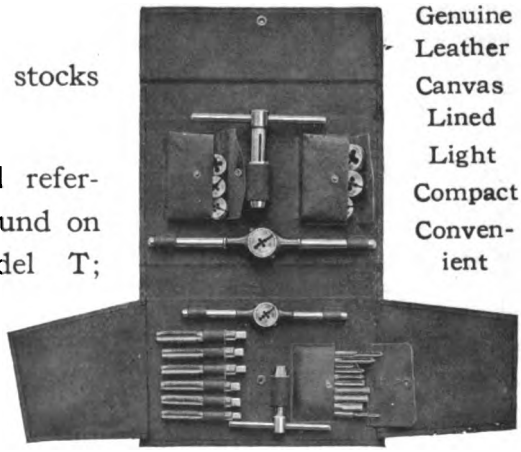
"Lightning" Auto-Repair Kit

Not a cheap bargain-counter eye-catcher. Genuine "Lightning" Taps and round split dies—backed by a 40-year reputation for high quality tools and our positive guarantee.

Only weighs 2½ lbs.

Has 16 taps, 16 dies, 2 stocks and 2 tap Wrenches.

Arranged with special reference to screw threads found on Ford Automobile, Model T; this assortment is also peculiarly adapted to a great variety of cars.



Genuine Leather Canvas Lined Light Compact Convenient

Dealers' prices on request

Wiley & Russell Manufacturing Co.

GREENFIELD, MASS.

NEW YORK 90 Centre Street | **PHILADELPHIA** 38 North 6th Street | **CHICAGO** 545 Washington Boulevard

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STAMPS (Continued)

STEEL STAMPS (Continued)

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

KAUTZ & Co., Fred C., Chicago, Ill.

MATTHEWS & Co., Jas. H., Pittsburg, Pa.

MAYER Co., Geo. J., Indianapolis, Ind.

MURDOCK, Jr., Co., Jas., Cincinnati, O.

NESS, Jr., Geo. M., New York, N. Y.

NEW York Stencil Works, New York, N. Y.

NOBLE & Westbrook, Hartford, Conn.

QUINT'S Sons Co., S. H., Philadelphia, Pa.

ROBBINS Mfg. Co., John, Boston, Mass.

SCHWERDTLE Stamp Co., Bridgeport, Conn.

WRIGHT & Son, Greg. G., Cincinnati, O.

STANDS

MOTOR REPAIR STANDS

HACO—See Hathorn Auto Co.

HATHORN Auto Co., Mason City, Ia. "Haco."

PORTABLE TOOL STANDS

NEW BRITAIN Machine Co., 10 Bigelow St., New Britain, Conn. (See page 547.)

WESTERN Tool & Mfg. Co., Springfield, O.

STOCKS

DIE STOCKS

AMERICAN Tap & Die Co., Greenfield, Mass. (See page 549.)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BAY State Tap & Die Co., Mansfield, Mass.

BESLY & Co., Charles H., Chicago, Ill.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt.

CARD Mfg. Co., S. W., Mansfield, Mass.

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CONANT & Donelson Co., Conway, Mass. "Reliable."

DUPLEX—See Hart Mfg. Co.

ECONOMY—See Wells & Son Co.

GREEN RIVER—See Wiley & Russell Mfg. Co.

HART Mfg. Co., Cleveland, O. "Duplex."

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

LOWELL Wrench Co., Worcester, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

REECE Co., E. F., Greenfield, Mass.

RELIABLE—See Conant & Donelson.

THISTLE—See Winter Bros. Co.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

WELLS & Son Co., F. E., Greenfield, Mass. "Economy."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning," "Green River." (See page 545.)

WINTER BROS. Co., Wrentham, Mass. "Thistle."

STONES

RUBBING STONES

AMERICAN Stone Co., Floyds Knobs, Ind. "Perrettes."

BENDER BIMSSTEIN—See Thurston Co.

EUREKA—See Waddell & Co.

EUREKA Rubbing Stone Co., Chicago, Ill.

GAMBURGER Bimsstein—See Rodriguez, R. E.

PERRETTES—See American Stone Co.

RHODES & Co., J. H., Chicago, Ill. (Importers.)

RODRIGUEZ, R. E., New York, N. Y. (Importer.) "Gamburger Bimsstein."

SCHUMACHERSCHE—See Waddell & Co.

THURSTON Co., F. W., Chicago, Ill. (Importer.) "Bender Bimsstein."

WADDELL & Co., R. J., New York, N. Y. (Importers.) "Schumachersche," "Eureka."

WADSWORTH, Howland & Co., Boston, Mass.

STOOLS

STEEL STOOLS

ERIE Stamping & Mfg. Co., Erie, Pa.

KALAMAZOO Steel Goods Co., Kalamazoo, Mich.

NEW Britain Machine Co., New Britain, Conn.

OHIO Mfg. Co., Painesville, O. (See page 465.)

SUPPLIES

ELECTRO-PLATING SUPPLIES

(This is a list of Dealers in Electro-Plating Supplies who advertise in this Publication.)

BACKUS & Leeser Co., 410-12 W. 13th St., New York, N. Y. (See page 547.)

ELECTRIC Smelting & Aluminum Co., Lockport, N. Y. (See page 507.)

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The "NEW BRITAIN"
Vise Stand and Bench

For

Chippers
Filers

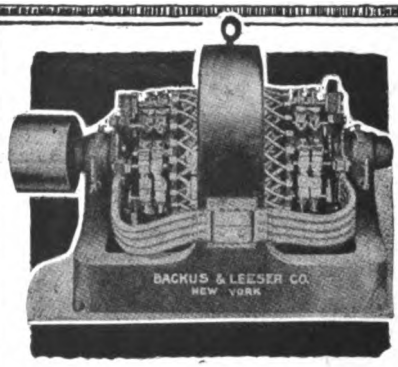
Assemblers
Erectors

A solid Vise Mount, that just fits in the Assembling Room.

May be set anywhere desired, can be had without tray, if preferred, and it's just as handy as it looks.

Write now for prices.

The New Britain Machine Co.
10 Bigelow Street,
NEW BRITAIN, CONN., U. S. A.



We manufacture dynamos for electro plating, polishing, buffing and galvanizing, as well as complete equipment and supplies for same.

Backus & Leeser Co.
410-412 W. 13th St.
New York, N. Y.

NOXON

Your car will glisten like a silver dollar in the sun if you polish it with

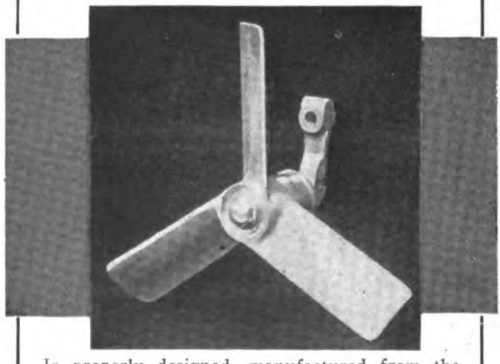
Noxon Metal Polish

Produces a wonderful brightness — cleans easy and quick. Saves you time and labor. Cleans windshields perfectly. NOXON is far superior and cheaper than any other polish.

Try a can today

Noxon Metal Polish Co.
HOBOKEN, N. J.

HOTZ CAST ALUMINUM RADIATOR FAN



Is properly designed, manufactured from the best material, by the best workmen, making it highest in efficiency, durability and quality.

The Fan You Have Wanted

Why not purchase the *HOTZ* fan it will give you better service at a price no higher than others.

The Hotz Foundry and Manufacturing Co.
Fremont, Ohio, U. S. A.
Also Founders of all kinds of Brass, Bronze, Aluminum Casting.
Equipped to machine same to customer's blue print.

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SUPPLIES (Continued)

FOUNDRY SUPPLIES

BRASS Founders Supply Co., Newark, N. J.

DETROIT Foundry Supply Co., Detroit, Mich.

HILL & Griffith Co., Cincinnati, O.

NIAGARA Devices, 614 Ellicott Sq., Buffalo, N. Y. (See page 521.)

OBERMAYER Co., S., Cincinnati, O.

OSBORN Mfg. Co., Cleveland, O.

PAXSON Co., J. W., 1019 N. Delaware Ave., Philadelphia, Pa. (See page 521.)

SMITH Foundry Supply Co., J. D., Cleveland, O.

STEVENS, Frederic B., Larned & Third Sts., Detroit, Mich. (See pages 535 and 536.)

WOODISON Co., E. J., Detroit, Mich.

MACHINE SHOP, GARAGE AND FACTORY SUPPLIES

(This is a list of Dealers in Machine Shop, Garage and Factory Supplies, who advertise in this publication)

FRASSE & Co., Peter A., New York, N. Y. (See page 589.)

MONTGOMERY & Co., 105-07 Fulton St., New York, N. Y. (See page 495.)

SWAGES

TOP AND BOTTOM SWAGES

(See Fullers and Swages)

SYSTEMS

SAND BLAST SYSTEMS

PANGBORN Corp., Hagerstown, Md.

TILGHMAN-BROOKSAND Sand Blast Co., Philadelphia, Pa.

TANKS

CHEMICAL FIRE TANKS

ACCURATE—See National Metal Stamping & Mfg. Co.

NATIONAL Metal Stamping & Mfg. Co., Newark, N. J. "Accurate."

TAPES

MEASURING TAPES

KEUFFEL & Esser Co., Hoboken, N. J.

LUFKIN Rule Co., Saginaw, Mich.

STARRETT Co., L. S., Athol, Mass.

TAPS

TAPS AND DIES

ADAMANTINE—See American Tap & Die Co.

AMERICAN Tap & Die Co., Greenfield, Mass. "Adamantine." (See page 549.)

BAY State Tap & Die Co., Mansfield, Mass.

BESLY Co., Charles H., Chicago, Ill.

BRUBAKER & Bros., W. L., Millersburg, Pa.

BUTTERFIELD & Co., Derby Line, Vt. "Derby."

CARD Mfg. Co., S. W., Mansfield, Mass.

CARPENTER Tap & Die Co., J. M., Pawtucket, R. I.

CHAMPION Blower & Forge Co., Lancaster, Pa.

CLEVELAND Twist Drill Co., Cleveland, O. (See pages 487 and 533.)

CONANT & Donelson Co., Conway, Mass. "Reliable."

DERBY—See Butterfield & Co.

DETROIT Twist Drill Co., 657-69 Fort St., Detroit, Mich. (See page 489.)

GEOMETRIC Tool Co., New Haven, Conn.

GREEN RIVER—See Wiley & Russell Mfg. Co.

HELMET—See Besly & Co.

HERCULES—See Wells & Son Co.

LIGHTNING—See Wiley & Russell Mfg. Co.

LITTLE GIANT—See Wells Bros. Co.

MANUFACTURERS Equipment Co., 100 N. Jefferson St., Chicago, Ill. (See page 473.)

MORSE Twist Drill & Machine Co., New Bedford, Mass.

PRATT & Whitney Co., Hartford, Conn. (See page 463.)

REED & Prince Mfg. Co., Worcester, Mass.

RELIABLE—See Conant & Donelson.

REMINGTON Tool & Machine Co., Woburn, Mass.

SMART Mfg. Co., A. J., Greenfield, Mass.

STANDARD Tool Co., Cleveland, O.

SUPERIOR Tap Co., Charlestown, N. H.

THISTLE—See Winter Bros. Co.

WEBSTER & Perks Tool Co., Springfield, O.

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

WELLS & Son Co., F. E., Greenfield, Mass "Hercules."

WILEY & Russell Mfg. Co., Greenfield, Mass. "Lightning," "Green River." (See page 545.)

WINTER Bros. Co., Wrentham, Mass "Thistle."

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THREADING TOOLS

A. L. A. M. STANDARD

AUTOMOBILE SCREW PLATES

MACHINE SCREW, HAND AND NUT TAPS AND DIES FOR MANUFACTURERS

Send for Catalogue and Discounts

AMERICAN TAP & DIE CO., Greenfield, Mass.

ELEPHANT BRAND

DELTA

REG. U. S. PAT. OFF.

THE PHOSPHOR BRONZE SMELTING CO.

2200 WASHINGTON AVENUE, PHILADELPHIA, PA.

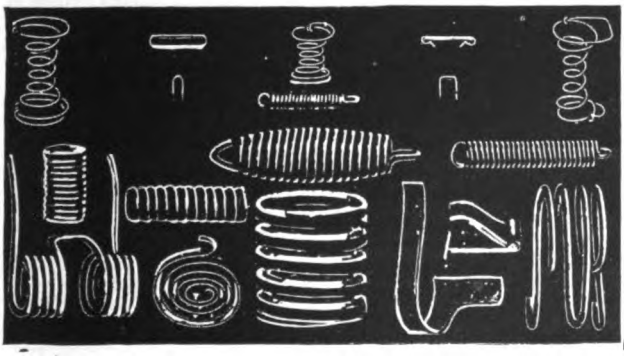
ELEPHANT BRAND "*Phosphor-Bronze*"

INGOTS, CASTINGS, WIRE, SHEETS, RODS, Etc.

— DELTA METAL —

IN BARS FOR FORGING AND FINISHED RODS

ORIGINAL AND SOLE MAKERS IN THE U. S.



The Wm. D. Gibson Co.

Huron & Kingsbury Sts., Chicago

SPRINGS

SPIRAL and FLAT

Steel, Brass and Phosphor Bronze

Special Shapes and Sizes to meet all requirements of Automobile Makers.

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TOOLS

LATHE AND PLANER TOOLS

BILLINGS & Spencer Co., Hartford, Conn.

CHAMPION—See Western Tool & Mfg. Co.

JOHNSON—See Pratt & Whitney Co.

MARCY Tool Works, Putnam, Conn.

O. K. Tool Holder Co., Shelton, Conn.

PRATT & Whitney Co., Hartford, Conn. "Johnson," "Rhodes," "Woodbridge. (See page 463.)

RHODES—See Pratt & Whitney Co.

STORTZ & Son, John, Philadelphia, Pa.

THOMPSON & Son Co., Henry G., New Haven, Conn.

WESTERN Tool & Mfg. Co., Springfield, O. "Champion."

WOODBRIDGE—See Pratt & Whitney Co.

MOLDERS TOOLS

DOBSON, Wm., Canastota, N. Y.

MONK, Chas., Brooklyn, N. Y.

PLANER TOOLS

(See Tools, Lathe and Planer)

PNEUMATIC TOOLS

CHICAGO Pneumatic Tool Co., Chicago, Ill.

CLEVELAND Pneumatic Tool Co., Cleveland, O.

DAYTON Pneumatic Tool Co., Dayton, O. "Green."

DUNLAP Mfg. Co., Columbus, O.

GREEN—See Dayton Pneumatic Tool Co.

HELWIG Mfg. Co., St. Paul, Minn.

IMPERIAL—See Ingersoll-Rand Co.

INDEPENDENT Pneumatic Tool Co., Chicago, Ill. "Thor."

INGERSOLL-RAND Co., New York, N. Y. "Imperial." (See page 529.)

MONARCH Pneumatic Tool Co., St. Louis, Mo.

OLDHAM & Son Co., George, Philadelphia, Pa.

PITTSBURG Pneumatic Co., Canton, O.

THOR—See Independent Pneumatic Tool Co.

THREADING TOOLS

GEOMETRIC Tool Co., New Haven, Conn.

MODERN Tool Co., Erie, Pa.

RIVETT Lathe & Grinder Co., Boston, Mass.

TORCHES

GASOLINE TORCHES AND FURNACES

AMERICAN Stove Co. (Ringen Div.), St. Louis, Mo.

AMERICAN Stove Co. (Schneider & Trenkamp Div.), Cleveland, O. "Reliable."

BABY—See McGill Mfg. Co.

BARTHEL—See Globe Gas Light Co.

BEST Light Co., Canton, O.

BRIDGEPORT Brass Co., P. O. Station L., Bridgeport, Conn. (See page 329.)

CLAYTON & Lambert Mfg. Co., Detroit, Mich.

GLOBE Gas Light Co., Boston, Mass. "Barthel."

McGILL Mfg. Co., Valparaiso, Ind. "Baby."

QUADRIGA Mfg. Co., Chicago, Ill. "Walters."

RELIABLE—See American Stove Co.

TURNER Brass Works, Sycamore, Ill.

VOLCANO Torch & Mfg. Co., Erie, Pa.

WALL Mfg. Supply Co., P., Pittsburg, Pa.

WALTERS—See Quadriga Mfg. Co.

WESTINGHOUSE Electric & Mfg. Co., Pittsburg, Pa.

TRAMMELS

TRAMMEL POINTS

GOODELL-PRATT Co., Greenfield, Mass.

STARRETT Co., L. S., Athol, Mass.

TRIMMERS

WOOD TRIMMERS

(Hand Power)

FOX Machine Co., Grand Rapids, Mich.

OLIVER Machinery Co., Grand Rapids, Mich.

VISES

DRILL PRESS VISES

ARMSTRONG-BLUM Mfg. Co., Chicago, Ill. "Marvel."

ARMSTRONG Bros. Tool Co., Chicago, Ill.

BLISSFIELD Motor Works, Blissfield, Mich. "Davenport."

BOWN Machine Co., Battle Creek, Mich.

CARTER & Hakes Co., Winsted, Conn.

CLEVELAND Machine Specialty Co., Toledo, O.

Complete Index to Classification appears on Pages 8 to 22.

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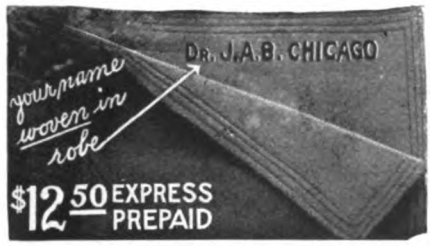


Name-on Auto Robes the Ones You Can't Lose

Dealers Take Notice:

You all can take orders for the Name-on-Robe, all that you require is sample Robe with your own name on; it makes no difference what your business, either garage, auto dealer supplies or salesman, remember you have no stock to carry.

The Name-On is woven to your order of the finest long fibre mohair, which is luxurious, durable and warm; bound with felt, tripled stitched and mitered corners. Robe is reversible, different color each side, name cannot be removed.

Any two of the following colors: Black, Lawn, Auto Grey, Blue, Maroon, Green, Tan and White.

54 x 72, $12.50. 54 x 84, $15.00

Get Circular and Discount.

J. & E. DAWSON

Fairhill Station Philadelphia, Pa.

The Problem of Lubrication Solved

by the use of the

Henry Grease Cup

Look at its construction!

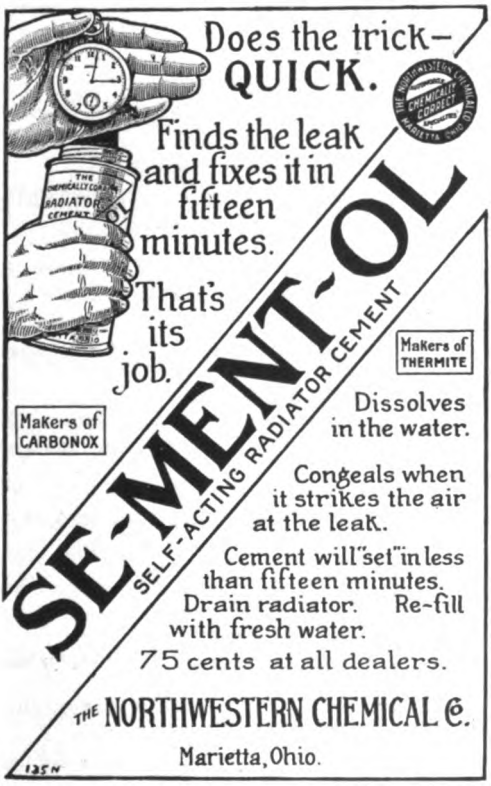
No cap to jar off, no threads to cross, no wear out to it. Cap quickly put on and removed by the pressure of a finger. A steady pressure and positive automatic lubrication at all times, once filled and regulating screw adjusted, nothing further required than a glance at the plunger, which is acting as an accurate indicator in regard to the amount of grease in the cup

Manufactured in all standard sizes.

Write for prices and descriptive circulars.

Henry Manufacturing & Grease Cup Co.

TERRE HAUTE, IND.



Puncture Troubles Prevented

Reg. U. S. Pat. Off.

Zip prevents loss of air from punctures and leaks. It is easily put in tire through valve; simply jack wheel up—let air out—put Zip in—inflate tire again—and then motor without fear of puncture trouble. Does this not sound comforting? Painful puncture memories compel the "Yes" answer.

ZIP Does Not Fill the Tire

It flows inside the tube and occupies only 4 per cent of the air space.

DEALERS—Write for our selling plan. We assist you to sell Zip. It is a big money maker. Write today.

ZIP COMPANY, Inc., Niagara Falls, N. Y.
Agents, ZIP COMPANY, Limited, London. Eng.; Toronto, Canada.
Zip Sales Agency, Inc., 176 W. 72d St., N. Y.

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VISES (Continued)

DRILL PRESS VISES (Continued)

DAVENPORT—See Blissfield Motor Works.

GRAHAM Mfg. Co., Providence, R. I.

HOGGSON & Pettis Mfg. Co., New Haven, Conn.

LIGHTNING—See Massey Vise Co.

MADDEN Bros. Co., Rushville, Ind.

MARVEL—See Armstrong-Blum Mfg. Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

MATHER & Warchter, Cleveland, O.

NORTH Wales Machine Co., North Wales, Pa.

PLUNKET, J. E., Chicago, Ill.

SKINNER Chuck Co., New Britain, Conn.

STERLING Grinding Wheel Co., Tiffin, O.

YOST Mfg. Co., G. M., Meadville, Pa.

HAND VISES

ATHOL Machine Co., Athol, Mass.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

DIKEMAN Mfg. Co., Norwalk, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

LOWELL Wrench Co., Worcester, Mass.

MALLEABLE Iron Fittings Co., Branford, Conn. "Mifco." (See page 477.)

MIFCO—See Malleable Iron Fittings Co.

MILLER'S Falls Co., New York, N. Y.

PHOENIX Hardware Co., Buffalo, N. Y.

SMITH, Otis A., Rockfall, Conn.

MACHINISTS VISES

AJAX—See Bonney Vise & Tool Works.

ANCHOR—See Prentiss Vise Co.

ATHOL Machine Co., Athol, Mass. "Simpson."

BARBOUR-STOCKWELL Co., Cambridgeport, Mass.

BARRETT Machine Tool Co., Meadville, Pa.

BONNEY Vise & Tool Works, Allentown, Pa. "Hercules," "Ajax."

BULL DOG—See Prentiss Vise Co.

CLINCHER—See Massey Vise Co.

COLUMBIAN Hardware Co., Cleveland, O.

EASTON Tool & Machine Co., Easton, Pa.

EMMERT Mfg. Co., Waynesboro, Pa. "Tiger."

ERIE Tool Works, Erie, Pa.

F & R—See Fulton Machine & Vise Co.

FISHER & Norris, Trenton, N. J.

FULTON Machine & Vise Co., Lowville, N. Y. "Star," "Peerless," "F. & R."

GOODELL-PRATT Co., Greenfield, Mass.

HERCULES—See Bonney Vise & Tool Works.

HOLLANDS Mfg. Co., Erie, Pa.

HOWARD Iron Works, Buffalo, N. Y.

JERSEY—See Stanley Rule & Level Co.

LEWIS—See Prentiss Vise Co.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Clincher." "Perfect," "Lightning."

MERRILL Bros., Maspeth, N. Y.

MONARCH—See Prentiss Vise Co.

PARKER Co., Charles, Meriden, Conn.

PEERLESS—See Fulton Machine & Vise Co.

PERFECT—See Massey Vise Co.

PHOENIX Hardware Co., Buffalo, N. Y.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

PRENTISS Vise Co., New York, N. Y. "Anchor," "Bull Dog," "Lewis," "Monarch," "Rapid Transit.'

RAPID TRANSIT—See Prentiss Vise Co.

REED Mfg. Co., Erie, Pa.

ROCK Island Mfg. Co., Rock Island, Ill.

SIMPSON—See Athol Machine Co.

STANLEY Rule & Level Co., New Britain, Conn. "Jersey."

STAR—See Fulton Machine & Vise Co.

TIGER—See Emmert Mfg. Co.

YOST Mfg. Co., G. M., Meadville. Pa.

MILLING MACHINE VISES

CARTER & Hakes Co., Winsted, Conn.

HENDLEY Machine Co., Torrington, Conn.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning."

PATTERN MAKERS AND WOOD-WORKERS VISES

ABERNATHY Vise & Tool Co., Chicago, Ill.

ATHOL Machine Co., Athol, Mass.

AYES & Co., Chicago, Ill.

BARBOUR-STOCKWELL Co., Cambridgeport, Mass. "Chandler & Washburn."

BLAKE—See Prentiss Vise Co.

BONNEY Vise & Tool Works, Allentown, Pa.

CHANDLER & WASHBURN—See Barbour-Stockwell Co.

CLINCHER—See Massey Vise Co.

COLUMBIAN Hardware Co., Cleveland, O.

EMMERT Mfg. Co., Waynesboro, Pa.

FISHER & Norris, Trenton, N. J.

HOLLANDS Mfg. Co., Erie, Pa.

LIGHTNING—See Massey Vise Co.

MASSEY Vise Co., Chicago, Ill. "Lightning," "Clincher."

OLIVER Machinery Co., Grand Rapids, Mich.

PARKER Co., Charles, Meriden, Conn.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

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Men who want to buy cars consult

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Motor Department

The merchant who has ten trucks to install, the doctor who wants an electric runabout, the banker who wants a $6,000 car and even the man who wants a $500 car.

Men who own cars ask advice about accessories —such as tires, shock absorbers, oils, even what kind of paint to repaint a car.

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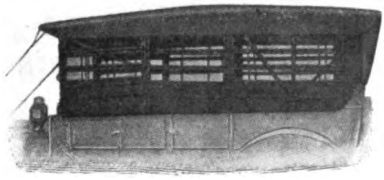
showing our line of Unit Power and Independent Transmissions. Jack Shafts and Steering Gears now ready. Want one?

Send Blue Print for estimate on any kind of gear-cutting or sprockets.

Cross Gear & Engine Company
DETROIT MICHIGAN



On in a flash—off in a flash. Clear vision the entire length of car; operated by simply pulling a strap and it is up; all fastenings are made from the inside of car; no flapping in the wind; no bulging in slip cover; takes no head room; automatic in action; efficient, durable, cheap, up-to-the-minute; shop rights to factories; retail branches in all large cities.

Detroit Flash Curtain Co.
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LBA

STORAGE BATTERIES

CLASS A
For Electric Lighting

CLASS B
For Electric Cranking and Lighting

LBA BATTERIES

will be found on 1912 models of over 80 per cent of the leading cars—could you have better proof of their quality?

Willard Storage Battery Co.
CLEVELAND, OHIO
New York Detroit Chicago

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VISES (Continued)

PATTERN MAKERS AND WOOD-WORKERS VISES (Continued)

PRENTISS Vise Co., New York, N. Y "Blake."

ROCK Island Mfg. Co., Rock Island, Ill.

TOLES Co., W. C., Chicago, Ill.

YOST Mfg. Co., G. M., Meadville, Pa.

PIN VISES

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BILLINGS & Spencer Co., Hartford, Conn.

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

FRAY Co., John S., Bridgeport, Conn.

GOODELL-PRATT Co., Greenfield, Mass.

LOWELL Wrench Co., Worcester, Mass.

STARRETT Co., L. S., Athol, Mass.

PIPE VISES

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BLAKE—See Prentiss Vise Co.

DIKEMAN Mfg. Co., Norwalk, Conn.

EASTON Tool & Machine Co., Easton, Pa.

EMMERT Mfg. Co., Waynesboro, Pa. "Tiger."

ERIE Tool Works, Erie, Pa.

FISHER & Norris, Trenton, N. J.

HOLLANDS Mfg. Co., Erie, Pa.

IDEAL—See Orange Machine & Mfg. Co.

MAGIC—See Prentiss Vise Co.

MARK Mfg. Co., Chicago, Ill.

MASSEY Vise Co., Chicago, Ill. "Perfect."

MONARCH—See Prentiss Vise Co.

ORANGE Machine & Mfg. Co., Orange, N. J. "Ideal."

OSWEGO Tool Co., Oswego, N. Y.

PARKER Co., Charles, Meriden, Conn.

PERFECT—See Massey Vise Co.

PITTSBURG Automatic Vise & Tool Co., Pittsburg, Pa.

PRENTISS Vise Co., New York, N. Y. "Blake," "Monarch," "Rex," "20th Century," "Shepard," "Magic."

REED Mfg. Co., Erie, Pa.

REX—See Prentiss Vise Co.

ROCK Island Mfg. Co., Rock Island, Ill.

SAUNDERS Sons, D., Yonkers, N. Y.

SHEPARD—See Prentiss Vise Co.

TIGER—See Emmert Mfg. Co.

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WALWORTH Mfg. Co., Boston, Mass. (See page 559.)

WELLS & Son Co., F. E., Greenfield, Mass.

YOST Mfg. Co., G. M., Meadville, Pa.

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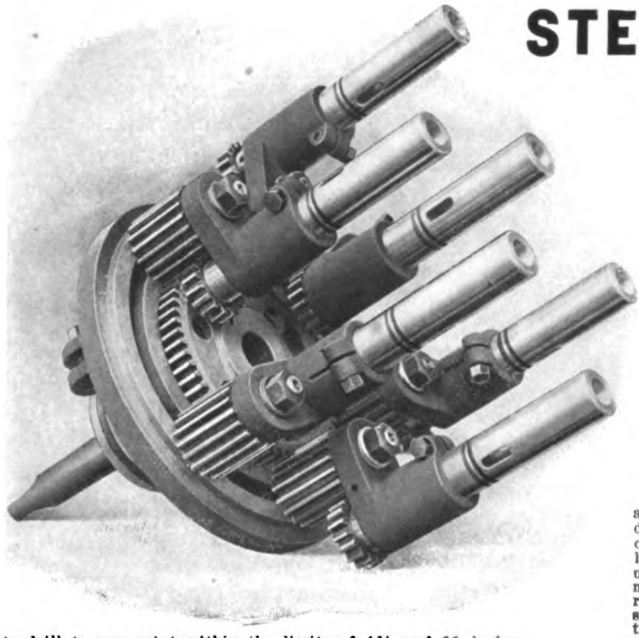

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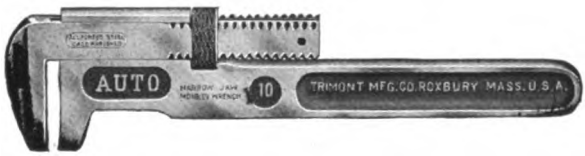

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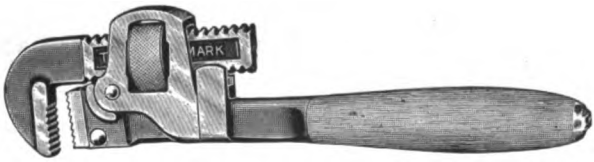

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ELECTRIC Emery Wheel Co., Newark, N. J.

HART—See Detroit Emery Wheel Co.

NATIONAL Corundum Wheel Co., Buffalo, N. Y.

NORTHAMPTON Emery Wheel Co., Leeds, Mass.

NORTON Co., Worcester, Mass.

PIKE Mfg. Co., Pike, N. H.

PITTSBURG Emery Wheel Co., Pittsburg, Pa.

SAFETY Emery Wheel Co., Springfield, O.

SPRINGFIELD Mfg. Co., Bridgeport, Conn.

STAR Corundum Wheel Co., Detroit, Mich.

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ARMSTRONG Bros. Tool Co., Chicago, Ill.

AUTO CLE—See Mossberg Co.

AUTO KING—See Azadian Gauge Mfg. Co.

AUTO QUEEN—See C. M. B. Wrench Co.

AZADIAN Gauge Mfg. Co., Syracuse, N. Y. "Auto King.'

B. & C.—See Bemis & Call Hardware & Tool Co.

BARNES Tool Co., New Haven, Conn.

BAY STATE AUTOKIT—See Cutter, Geo. A.

BEMIS & Call Hardware & Tool Co., Springfield, Mass. "B. & C."

BETTCHER Mfg. Co., Cleveland, O.

BILLINGS & Spencer Co., Hartford, Conn.

BONNER Mfg. Co., C. E. Champaign, Ill. "Victor."

BONNEY Vise & Tool Works, Allentown, Pa.

BORNSTEIN & Co., Ipswich, Mass.

BOSSERT Co., Utica, N. Y. (See page 233.)

BRAUNSDORF-MUELLER Co., Elizabeth, N. J.

BRIDGEPORT Hardware Mfg. Corp., Bridgeport, Conn.

BUCKEYE—See Lamson & Sessions Co.

C. M. B. Wrench Co., Garwood, N. J. "Silver King." "Auto Queen."

CHAMPION—See Syracuse Wrench Co.

COES Wrench Co., Worcester, Mass.

CONVERTIBLE Ratchet Wrench Co., Allentown, Pa.

CRESCENT Tool Co., Jamestown, N. Y. (See page 489.)

CRONK & Carrier Mfg. Co., Elmira, N. Y.

CUTTER, Geo. A., Taunton, Mass. "Bay State Autokit." "Stickit." (See page 559.)

DIAMOND—See Mossberg Co.

DUDLY Tool Co., Menominee, Mich.

EAGLE Claw Wrench Co., Rockford, Ill. (See page 559.)

EAMES Tool Co., Lynn, Mass.

EMPIRE—See Hjorth & Co.

ERIE Stamping & Mfg. Co., Erie, Pa. "Esco."

ESCO—See Erie Stamping & Mfg. Co.

GARAGE Equipment Mfg. Co., Milwaukee, Wis. "Gemco." (See page 221.)

GEMCO—See Garage Equipment Mfg. Co.

GIRARD Wrench Mfg. Co., Girard, Pa.

GLOBE Wrench Co., Ipswich, Mass.

GUERNSEY Wrench Co., Lawrence, Mass.

HALL Co., Chas. E., Buffalo, N. Y.

HARRIS & Reed Mfg. Co., Chicago, Ill.

HERBRAND Co., Fremont, O.

HERCULES—See American Thermo Ware Co.

HJORTH & Co., Wm., Jamestown, N. Y. "Empire," "Lightning."

INDIANAPOLIS Drop Forging Co., Indianapolis, Ind.

KEYSTONE—See Providence Auto Equipment Co.

KEYSTONE Mfg. Co., Buffalo, N. Y. "Westcott."

KILBORN & Bishop Co., New Haven, Conn. "Saxon."

LAKESIDE Forge Co., Erie, Pa.

LAMSON & Sessions Co., Cleveland, O. "Buckeye."

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LITTLE GIANT—See Wells Bros. Co.

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LOWENTRAUT Mfg. Co., P., Newark, N. J. "U. S."

MICHIGAN Bolt & Nut Works, Detroit, Mich.

MILLER, Charles, Syracuse, N. Y.

MOORE Drop Forging Co., Springfield, Mass.

MOSSBERG Co., Frank, Attleboro, Mass. "Sterling," "Diamond," "Alderman," "National," "Auto Cle." (See page 557.)

NATIONAL—See Mossberg Co.

NEW Britain Mfg. Co., New Britain, Conn.

NEW England Forge Co., Worcester, Mass.

NIAGARA Falls Metal Stamping Works, Niagara Falls, N. Y. "Pokitrenchiz."

PACKER Auto Specialty Co., Chicago, Ill. "Ray."

PAGE-STORMS Drop Forge Co., Chicopee, Mass.

PECK, Stow & Wilcox Co., Southington, Conn.

PERFECT HANDLE—See Smith & Co.

PICK-UP—See New Britain Mfg. Co.

POKITRENCHIZ—See Niagara Falls Metal Stamping Works.

PROVIDENCE Auto Equipment Co., Providence, R. I. "Keystone."

RAY—See Packer Auto Specialty Co.

REX Wrench Co., Boston, Mass.

ROEBLINGS Sons Co., John A., Trenton, N. J.

RONSON Specialty Co., Newark, N. J.

S. & I. Co., Springfield, Mass.

SAXON—See Kilborn & Bishop Co.

SCHOENBORN, A. J., Greenleaf, Kans.

SILVER KING—See C. M. B. Wrench Co

SMITH & Co., H. D., Plantsville, Conn. "Perfect Handle."

STARRETT Co., L. S., Athol, Mass.

STERLING—See Mossberg Co.

STICKIT—See Cutter, Geo. A.

SYRACUSE Wrench Co., Syracuse, N. Y. "Champion," "Yala."

TRIMO—See Trimont Mfg. Co.

TRIMONT Mfg. Co., Roxbury, Mass. "Trimo." (See page 555.)

TURNER & Deegan, Bristol, Conn.

U. S.—See Lowentraut Mfg. Co.

U. S. RATCHET Wrench Co., Peoria, Ill.

VICTOR—See Bonner Mfg. Co.

VLCHEK Tool Co., Cleveland, O.

WAKEFIELD, Clarence E., Worcester, Mass.

WALDEN Mfg. Co., 69 Beacon St., Worcester, Mass. (See page 489.)

WELLS Bros. Co., Greenfield, Mass. "Little Giant."

WESTCOTT—See Keystone Mfg. Co.

WHITMAN & Barnes Mfg. Co., Akron, O.

WILLIAMS & Co., J. H., Brooklyn, N. Y.

WORCESTER Pressed Steel Co., Worcester, Mass. (See page 169.)

WRIGHT Wrench & Forging Co., Canton, O

YALA—See Syracuse Wrench Co.

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AJAX Wrench Co., Toledo, O.

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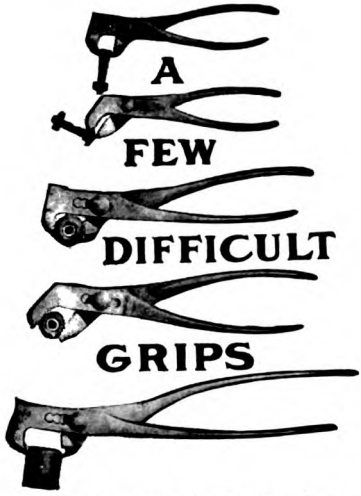

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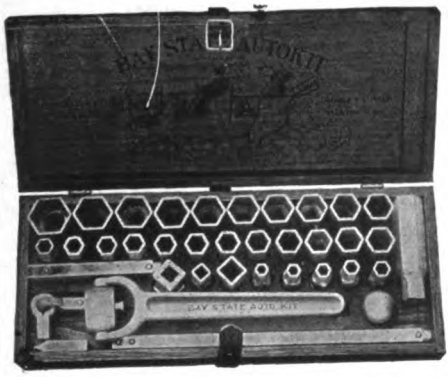

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PIPE WRENCHES (Continued)

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VICTOR—See Bonner Mfg. Co.

VIXEN—See Bonney Vise & Tool Works.

WALWORTH Mfg. Co., Boston, Mass. "Stillson." (See page 559.)

WELLS & Son Co., F. E., Greenfield, Mass.

WESTCOTT—See Keystone Mfg. Co.

WRIGHT Wrench & Forging Co., Canton, O. "Stover."

TAP AND REAMER WRENCHES

ALERT Tool Co., Philadelphia, Pa.

AMERICAN Tap & Die Co., Greenfield, Mass. "Eagle." (See page 549.)

ARMSTRONG Mfg. Co., Bridgeport, Conn.

BASCOM—See Smart Mfg. Co.

BAY State Tap & Die Co. Mansfield, Mass.

BERGMAN Tool Mfg. Co., Buffalo, N. Y.

BESLY & Co., Charles H., Chicago, Ill.

BILLINGS & Spencer Co., Hartford, Conn.

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BRUBAKER & Bros., W. L., Millersburg, Pa.

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WELLS & Son Co., F. E., Greenfield, Mass. "Hercules."

WEST Haven Mfg. Co., New Haven, Conn.

WILEY & RUSSELL Mfg. Co., Greenfield, Mass. "Green River," "Lightning." (See page 545.)

Complete Index to Classification appears on Pages 8 to 22.

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Tables and Data

PART IV

Reference Tables, Data and Formulæ, including Reports on Tests of Materials, S. A. E. Standards. etc., also a Directory of National Trade Associations

A complete index to this section appears on pages 23 to 26

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PART IV

TABLES AND DATA

REFERENCE TABLES FOR INDICATED HORSEPOWER

It is often convenient to have a ready reference table, by the aid of which an immediate approximation to the horsepower of a motor can be made when the bore and stroke are known. Such a table has been prepared by Worby Beaumont, the well-known English engineer, who gave permission to the editor of *The Automobile Club Journal* in London to publish it. One table gives the ratings of engines with the cylinder dimensions in inches and fractions, and the other table gives the results with cylinders built to metric measurements. Of course, in a table of this sort, an arbitrary set of conditions as to revolutions, mean effective pressure and mechanical efficiency have to be assumed; those employed represent average practice and the table is not offered as a substitute for experimentation when the most accurate results are desired.

It will be noted from Table I that in a very small space the estimated indicated power of engines with bore and stroke dimensions varying from 2-in. bore and 2-in. stroke to 6-in. bore and 6 1-2-in. stroke is given. Similarly, in Table II, a similar series is given in metric measurement, covering sizes from 70 mm. bore and 70 mm. stroke to 150 mm. bore and 165 mm. stroke. In Table I there is a quarter of an inch difference of size of bore and stroke measurements between any two powers given, and in Table II a difference of 5 mm. In explanation of the tables, it will be seen that in column 1 the bore or cylinder diameter of the engine may be found, and in the columns to the right of this, commencing with the column headed 0, the power of the engine having that cylinder diameter and a stroke of the same dimension. Columns 3 to 10 in each table give the powers of engines of, for instance, the same bore, but having a stroke greater than the bore by the amount stated at the top of the column. For example, referring to Table I, an engine having a cylinder 4 inches in diameter and a stroke of 4 inches would develop, under conditions to be stated, 4.27 i.h.p., as shown in the column headed 0; that is, column 2. If, however, the engine has a cylinder bore of 4 inches and a stroke of 5 1-2 inches, then the power developed is as shown in column 8, 5.89 i.h.p.

Similarly, for example, referring to Table II, an engine having a bore and stroke of 100 mm. would give 4.09 i.h.p., and an engine with a cylinder 100 mm. diameter and 140 mm. stroke would give 5.72 i.h.p.

It will be observed that to each bore dimension in column 1, two horizontal lines are given. The first of these gives the calculated power at a speed of 750 revolutions per minute, and the second the power at 1,000 revolutions per minute. The figures for the higher speed are printed in italic type.

The powers given in the tables represent the calculated indicated power given by one cylinder, and when multi-cylinder engines are being considered, the power shown by the table must be multiplied by the number of cylinders to give the total power.

To determine the useful power or brake horsepower, the mechanieal efficiency of the engine has to be considered. No general rule can be given for this, and it may vary from a little less than 80 per cent. of the indicated power to as much as 88 per cent. For the majority of four-cylinder engines of good design and in good condition, run at speeds not unsuited to their design, and for powers of not less than 20 b.h.p., the efficiency may be considered to be 85 per cent. within reasonably close limits of accuracy. This figure is, however, merely suggestive, and it is necessary to be familiar with engine design and performances to correctly estimate the brake horsepower from the estimated indicated power of these small high-speed engines.

Very frequently an approximation to the calculated indicated power, or power developed in the cylinders, is all that is required to be known, and this may be taken direct from the tables, for the two named speeds; *i.e.*, 750 or 1,000 revolutions per minute. For other speeds the difference may be taken as arithmetically proportionate through a limited range according to the type and design of the engine.

(Continued on page 564)

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HORSE POWER TABLE I—Cylinder Dimensions in Inches and Fractions

Bore	0	¼	⅓	¾	1	¼	½	¾	2
2.....	0.54	0.60	0.67	0.74	0.81	0.88	0.94	1.01	1.08
	0.72	0.80	0.89	0.98	1.08	1.17	1.25	1.35	1.44
2¼.....	0.76	0.84	0.92	1.01	1.09	1.18	1.26	1.35	1.43
	1.01	1.12	1.22	1.34	1.45	1.57	1.68	1.81	1.90
2½.....	1.04	1.15	1.25	1.35	1.46	1.56	1.67	1.77	1.88
	1.39	1.53	1.67	1.81	1.95	2.09	2.23	2.37	2.51
2¾.....	1.39	1.51	1.64	1.77	1.89	2.02	2.14	2.27	2.40
	1.85	2.02	2.19	2.36	2.55	2.70	2.87	3.04	3.20
3.....	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	3.00
	2.40	2.60	2.80	3.00	3.21	3.40	3.61	3.81	4.00
3¼.....	2.30	2.47	2.65	2.82	3.00	3.18	3.36	3.53	3.70
	3.06	3.28	3.52	3.76	3.99	4.22	4.45	4.70	4.92
3½.....	2.86	3.06	3.27	3.48	3.68	3.88	4.09	4.30	4.50
	3.81	4.09	4.36	4.63	4.90	5.18	5.45	5.72	6.00
3¾.....	3.53	3.76	4.00	4.35	4.47	4.71	4.95	5.18	5.41
	4.71	5.02	5.34	5.65	5.97	6.28	6.60	6.91	7.23
4.....	4.27	4.65	4.81	5.08	5.35	5.61	5.89	6.15	6.41
	5.71	6.06	6.42	6.78	7.13	7.50	7.85	8.20	8.55
4¼.....	5.13	5.44	5.74	6.04	6.34	6.64	6.95	7.25	7.55
	6.84	7.24	7.64	8.05	8.45	8.85	9.25	9.66	10.06
4½.....	6.19	6.53	6.87	7.22	7.56	7.90	8.25	8.59	8.93
	8.25	8.68	9.16	9.62	10.08	10.54	10.96	11.41	11.89
4¾.....	7.18	7.55	7.94	8.31	8.70	9.07	9.45	9.82	.....
	9.57	10.07	10.57	11.09	11.58	12.08	12.59	13.09	.....
5.....	8.38	8.80	9.22	9.65	10.05	10.46	10.90	.....	.....
	11.16	11.72	12.28	12.84	13.40	13.95	14.50	.....	.....
5¼.....	9.70	10.16	10.62	11.09	11.54	12.00	.....	.....	.....
	12.92	13.54	14.15	14.76	15.40	16.00	.....	.....	.....
5½.....	11.12	11.65	12.15	12.66	13.15	.....	.....	.....	.....
	14.84	15.51	16.20	16.86	17.54	.....	.....	.....	.....
5¾.....	12.71	13.27	13.82	14.38	.....	.....	.....	.....	.....
	16.96	17.70	18.42	19.10	.....	.....	.....	.....	.....
6.....	14.45	15.05	15.65	.....	.....	.....	.....	.....	.....
	19.25	20.05	20.85	.....	.....	.....	.....	.....	.....

(Continued on page 566)

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It is never filed or thrown away, but, to the contrary, is in active daily use—not by one-time buyers but by those who buy in big quantities.

Figure the selling radius of action which may be yours if you will adopt our suggestion to contract for one year's advertising in this, the universally recognizel, Directory of the industry.

Four bills cover one year's advertising.

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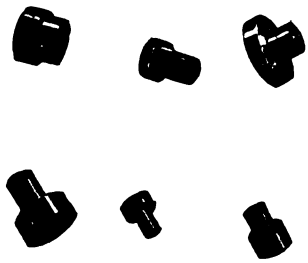
THE AUTOMOBILE TRADE DIRECTORY
231-241 West 39th Street New York



SAVE PLATINUM

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Made with necessary Platinum or Platinum Iridium in the heads and welded on Nickel Shanks. By saving useless platinum in the shank we reduce the cost. Used by a large proportion of manufacturers of Magnetos, Spark Coils and other electrical apparatus. Why use platinum for mechanical fastening?

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HORSE POWER TABLE II—Cylinder Dimensions in Millimeters (Metric System)

Bore	0	5	10	15	20	25	30	35	40
70.....	1.40	1.50	1.59	1.69	1.80	1.89	1.99	2.10	2.20
	1.87	2.00	2.13	2.26	2.40	2.53	2.66	2.80	2.94
75.....	1.72	1.84	1.95	2.07	2.18	2.29	2.41	2.53	2.64
	2.30	2.45	2.60	2.76	2.91	3.06	3.22	3.37	3.52
80.....	2.09	2.23	2.35	2.49	2.62	2.76	2.88	3.02	3.14
	2.70	2.97	3.14	3.32	3.49	3.67	3.84	4.02	4.19
85.....	2.43	2.65	2.80	2.95	3.09	3.24	3.39	3.54	3.69
	3.34	3.54	3.73	3.93	4.12	4.32	4.52	4.72	4.91
90.....	2.97	3.14	3.30	3.46	3.64	3.80	3.96	4.13	4.30
	3.96	4.18	4.40	4.62	4.85	5.06	5.28	5.50	5.72
95.....	3.50	3.68	3.87	4.05	4.24	4.42	4.61	4.80	4.98
	4.67	4.91	5.16	5.40	5.65	5.90	6.15	6.40	6.64
100.....	4.09	4.29	4.49	4.70	4.90	5.11	5.30	5.51	5.72
	5.45	5.71	5.99	6.26	6.58	6.81	7.07	7.35	7.62
105.....	4.73	4.95	5.17	5.40	5.63	5.85	6.08	6.30	6.53
	6.30	6.60	6.90	7.20	7.50	7.80	8.10	8.40	8.70
110.....	5.43	5.69	5.93	6.19	6.44	6.68	6.96	7.16	7.42
	7.23	7.58	7.90	8.25	8.57	8.90	9.23	9.55	9.90
115.....	6.22	6.48	6.77	7.03	7.30	7.56	7.85	8.11	8.37
	8.30	8.65	9.02	9.38	9.74	10.01	10.46	10.81	11.18
120.....	7.07	7.37	7.66	7.96	8.25	8.53	8.84	9.13	9.41
	9.42	9.82	10.21	10.61	11.00	11.39	11.79	12.18	12.57
125.....	7.97	8.30	8.63	8.94	9.25	9.57	9.89	10.21	10.54
	10.64	11.06	11.50	11.91	12.34	12.76	13.20	13.61	14.04
130.....	8.95	9.30	9.65	9.90	10.34	10.70	11.01	11.38	.....
	11.94	12.40	12.86	13.31	13.79	14.25	14.70	15.16	.....
135.....	10.08	10.44	10.80	11.18	11.56	11.92	12.30	.....	.....
	13.41	13.91	14.40	14.90	15.41	15.90	16.40	.....	.....
140.....	11.22	11.65	12.04	12.44	12.84	13.25	.....	.....	.....
	14.99	15.51	16.05	16.60	17.12	17.68	.....	.....	.....
145.....	12.52	12.98	13.41	13.82	14.25	.....	.....	.....	.....
	16.70	17.30	17.88	18.42	19.00	.....	.....	.....	.....
150.....	13.81	14.26	14.72	15.40	.....	.....	.....	.....	.....
	18.41	19.01	19.64	20.23	.....	.....	.....	.....	.....

Index to Tables and Data appears on Pages 23 to 26

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ALLEN Steam Vulcanizers

Simple, Clean, Handy, Perfect in Construction, Rapid in Operation and Most Efficient in Every Respect. Money Makers in any Garage or Repair Shop. Five different models—$20 to $45 net.

Complete detailed catalog on request.

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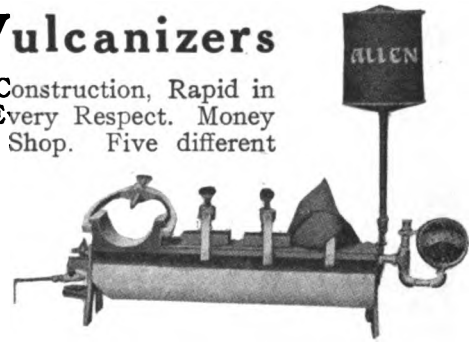

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Die-Cast Finished Parts, ready to assemble with absolutely no machining. All Holes, Threads, Lugs and Irregular-Shaped Milling Cuts finished in the operation of casting.

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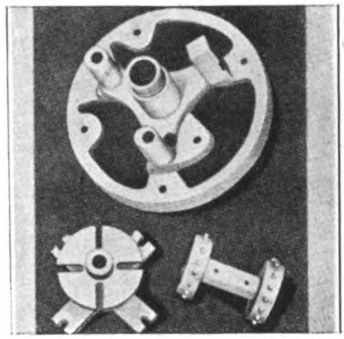

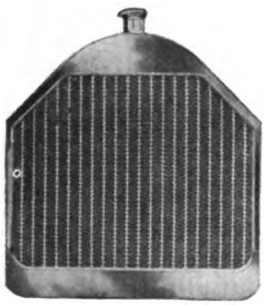

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No Leaks — No Freezing Effects
Maximum Efficiency — Strong, Light, Durable
Excellent Appearance

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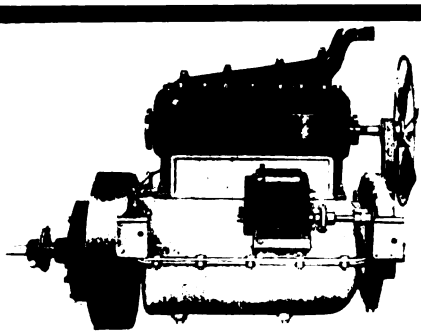

Model "B" 4 1-8" x 5

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DESIGNERS AND BUILDERS OF MOTORS FOR PLEASURE AND COMMERCIAL CARS

Powerful, Reliable, Speedy

Catalogue will be mailed on Request

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HORSE-POWER OF INTERNAL COMBUSTION MOTORS (H. H. BROWN)

Owing to the great number of factors which influence the power delivered by high speed internal combustion engines the only sure way of determining this is by a brake test Nevertheless, for purposes of easy comparison or for a basis for handicapping, various authorities and associations have compiled various formulas from which the approximate D. H. P. can be calculated when certain data are known. In some cases a certain piston speed is assumed, while in others a certain r. p. m. is assumed. In these cases only the diameter and the stroke of the piston need be known.

In some of these formulas as originally compiled the area of the bore was taken as one of the factors, in others the stroke was expressed in feet or decimal fractions thereof. For the sake of uniformity and to save work the formulas are altered so that the square of the bore is used and the stroke is expressed in inches.

TABLES OF HORSEPOWER FORMULAS

Four-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. For gas.	$D^2 \times L \times R \times n$	19000
Roberts. For gasoline.	$D^2 \times L \times n \times R$	18000
A. L. A. M.	$D^2 \times n$	2.5

This formula is on a basis of 1000-ft. piston speed.

American Power Boat Association.*	$D^2 \times n$	$\frac{2.000}{0.7854} = 2.5338$
A. P. B. A.* for motors of less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{1.000 \times 12}{.7854} = 15.20$

*The two formulas given above are for motors of boats rated as automobile boats. For others the rating should be taken as two-thirds of that given by these formulas. In case some device is used to force the charge into the cylinder 10 per cent. should be added to the ratings.

If an expansion or lower pressure-cylinder is used 20 per cent. of the square of the diameter of this cylinder or cylinders shall be added to the $D^2 \times n$ and divided by the regular constant.

(Continued on page 570)

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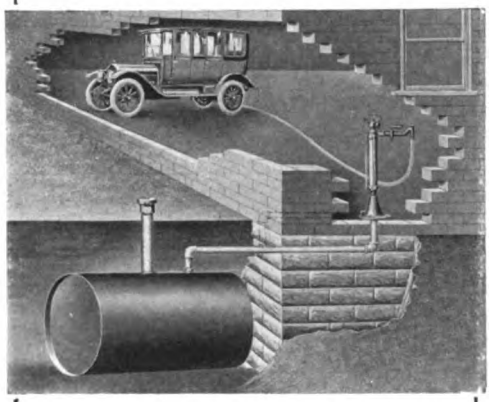
Cam Shafts
Springs
Valves
Stampings

HIBBARD
Engineering Co.
Detroit, Michigan

SCAIFE GASOLINE STORAGE OUTFITS

Have no complicated parts to get out of order.



The Cheapest Safe and Thoroughly Practical Outfit Sold.
Wm. B. SCAIFE & SONS CO.
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PITTSBURGH, PA.
New York Office: 26 Cortlandt St.

Cleveland-Canton "Chreme Vanadium" Automobile Springs

These remarkable springs are manufactured from a special type of Vanadium Steel—a steel that will carry forty tons to the square inch without taking permanent set.

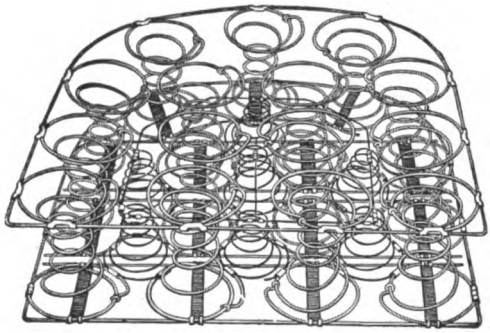
Heat treated in oil—not merely flashed in oil or chilled with water—the springs are full of life and elasticity, yet so tough and strong that they can be absolutely relied upon in emergencies.

OUR high grade springs are known to the trade as follows:

Best Grade—"Chrome Vanadium"
Next Grade—"Special Analysis"

Quality, Not Quantity

The Cleveland-Canton Spring Co.
Canton, Ohio



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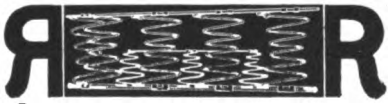

Best Automobile Spring Ever Made
No Possible Bumps or Jars — See these Auxiliary Springs?

The Best Cushions are made with Ventilated Buttons AND Rough Rider Springs

NOTHING SO COMFORTABLE
No Shocks or Jars when Rough Riders are used

Manufactured by
JACKSON CUSHION SPRING CO., Jackson, Mich.
RANDOLPH EDWARDS CO. Exclusive Selling Agents

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Two-cycle Engines

D = Diameter of cylinder in *inches*. L = Stroke of piston in *inches*. R = Revolutions per minute of crank shaft. n = Number of cylinders.

Authority for Formula	Factors Used	Constant or Divisor
Roberts. Gas.	$D^2 \times L \times R \times n$	14000
Roberts. Gasoline.	$D^2 \times L \times R \times n$	13500
American Power Boat Association.*	$D^2 \times n$	$\frac{1.65}{.7854} = 2.1008$
Same for less than 6 inches stroke.	$D^2 \times L \times n$	$\frac{12 \times .85}{\times .7854} = 12.987$

*The above are for automobile racing boat engines; for others the rating is taken as two-thirds of the above formulas. For engines having a displacer cylinder or cylinders the above rating is increased in the ratio that the displacer piston's displacement bears to that of the working cylinders.

INDICATED HORSEPOWER

On account of the great difficulty of securing good indicator cards at the high-piston and rotative speeds of automobile motors this is very little employed. The manograph which is employed for obtaining cards or diagrams from high-speed motors, as a general thing does not have an equal pressure scale and therefore does not readily lend itself to the accurate determination of I. H. P.

The indicated H. P. may of course be determined approximately by assuming a certain mechanical efficiency for the motor under consideration. This varies from as high as 90 per cent. in some cases to lower than 70 per cent. in others; the average would probably be not far from 80 per cent.

The formula for I. H. P., the bore and stroke being known as well as the R. P. M. and the mean effective pressure, is,

$$\frac{D^2 \times L \times R.P.M. \times n \times M.E.P.}{\frac{33{,}000. \times 12 \times 2}{.7854}} = I.H.P. \text{ (for 4-cycle).}$$

This constant equals 550,000 and the formula becomes $\frac{D^2 \times L \times n \times M.E.P. \times K.}{550{,}000.}$

The constant for 2-cycle is 275,000.

A formula which is given by Grover for the mean effective pressure, the compression being known, is as follows:

$$M.E.P. = {}_2C - 0.01\ C^2$$

C = Compression pressure above atmosphere in pounds per square inch.

This formula does not hold good for compression pressures over 100 pounds per square inch above atmosphere. Comparatively recent data seems to prove the reliability of this formula, also the fact, which Grover points out, that under favorable conditions, the values given by this formula may be slightly exceeded. Tests with higher pressures than 100 pounds show that the M. E. P. tends to remain at 100 pounds per square inch.

The compression pressure may be obtained by some form of gauge, the ignition for that cylinder being cut off, or in case the volume of the explosion chamber is known it may be obtained from the formula.

$PV^{1.3}$ = Constant. P being the absolute pressure.

V being taken in the one case as the volume of the combustion chamber and in the other as the above plus the piston displacement. P being in one case atmospheric pressure and in the other the absolute compression pressure. Of course for C in Grover's formula, the assumed atmospheric pressure should be subtracted from the result obtained by this formula.

Index to Tables and Data appears on Pages 23 to 26

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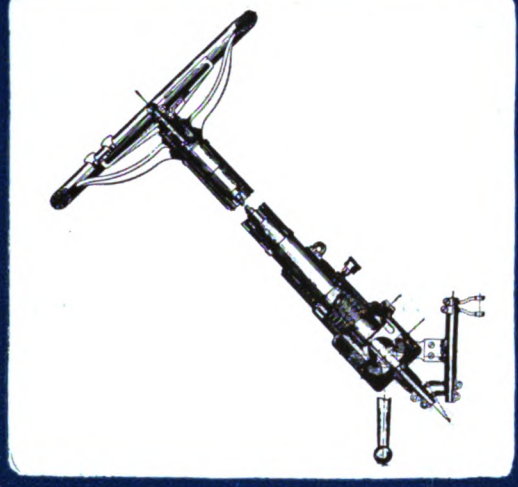
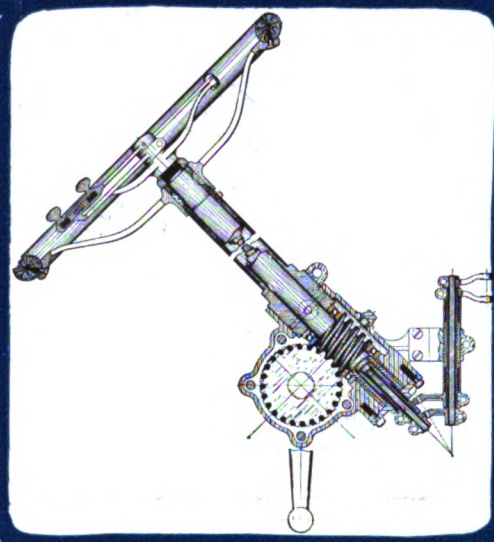


MODEL C GEAR



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MADE BY

STEERING GEAR SPECIALISTS

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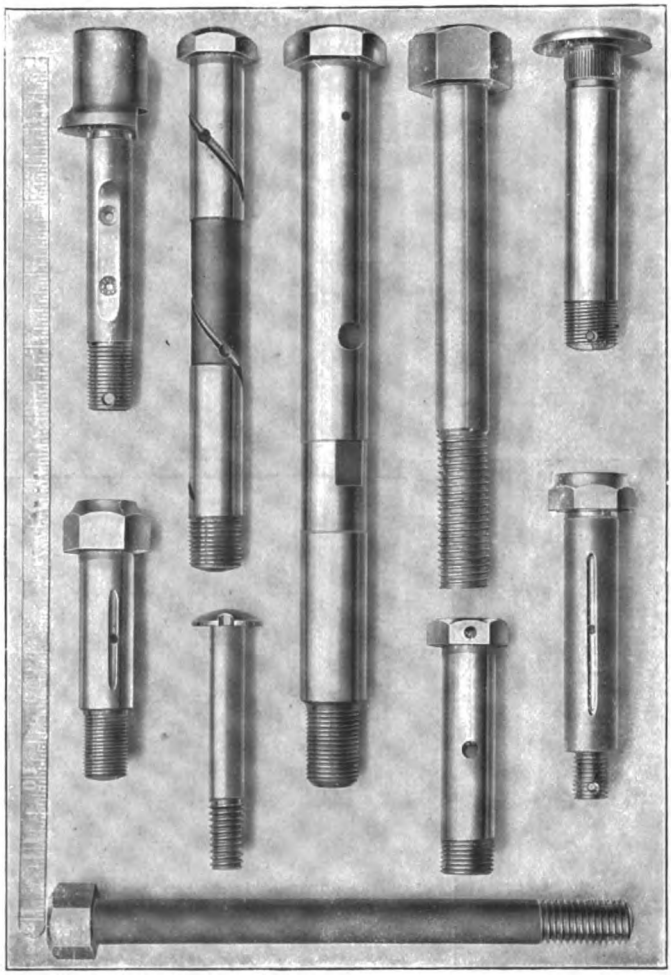

Bolts and Screws

Transmission Bracket Bolts
Engine Bracket Bolts
Radius Rod Bracket Bolts
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King or Knuckle Bolts
Steering Gear Bracket Bolts
Water Motor Support Bolts
Center Bearing Bolts
Radius Rod Swivel Bolts
Trans. Center Bolts
Trans. Support Bolts
Countershaft Bearing Bolts
Support Bolts
Engine Arm Bolts
Jack Shaft Bracket Bolts
Any bolt 2½" x ½" or larger.

The finish, strength and accuracy of our bolts and screws are the result of our exclusive process—electric welding.

We use finer, tougher steel, make the pieces stronger and finish them better than can be done by any other method.

Those who consider quality important will find our prices attractive.

THE ELECTRIC WELDING PRODUCTS CO.
Cleveland, Ohio

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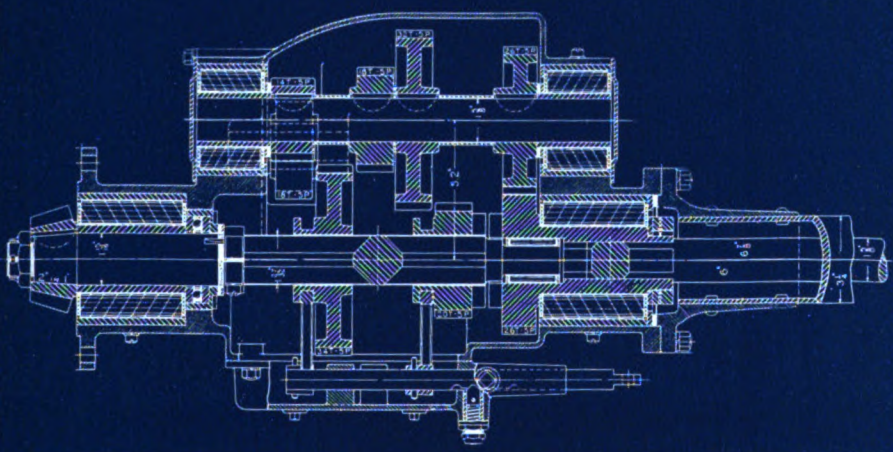

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The present day buyer of a motor vehicle looks for and appreciates the use of parts of known reputation and quality. For instance, the recognized standing of the Covert Transmission adds to the reputation and sales value of any car on which it is used.

Manufacturers who realize this fact, add to the reliability and service value of their cars, at the same time cutting down production expense, by adopting the Covert Transmission.

The leading manufacturers of Axles and Jackshafts have standardized their product to take the various Covert Models.

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TRANSMISSIONS

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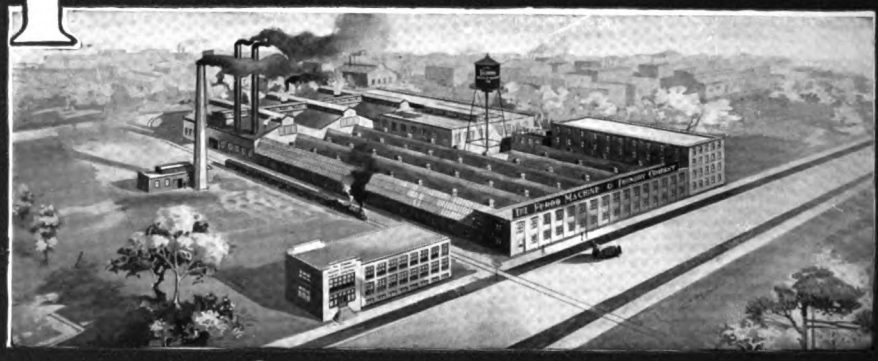

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CONTRACT FOUNDRY and MACHINE WORK OF ALL KINDS SOLICITED

If you are interested in the manufacture of any metal specialty such as

Automobile Engines
Marine Engines
Motor Cycle Engines
Stationary Engines
Air Compressors
Transmission
Light Machinery of all Kinds

you will find it to your advantage to have the work turned out in a modern factory like this, where castings are made scientifically by the best foundry men money can hire under the supervision of a competent chemist, and more than $250,000 worth of machine tools, jigs, dies and fixtures are available for use, so that each particular operation is done with the greatest efficiency and economy.

We are equipped to work from your blue prints or specifications, preparing patterns, etc., making castings, doing all necessary machining and delivering you either individual parts or the complete product assembled and tested, relieving you entirely of responsibility and risk in manufacture, and leaving you free to devote all your time and energy to the selling proposition. Write for estimate.

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We absolutely protect you on deliveries. Accurate work guaranteed. Our prices will be found lower than the majority of factories can produce this class of work. Let us quote you from your blueprints.

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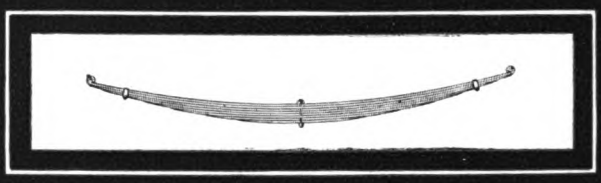
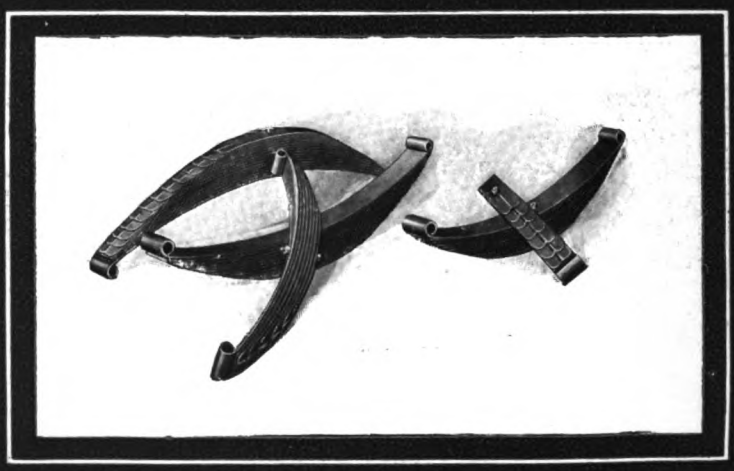


RELIABLE SPRINGS ARE MORE IMPORTANT ON COMMERCIAL CARS THAN ON PLEASURE CARS



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Simple in design, fool proof in construction, a boy can operate it, obtaining perfect prints.

Send for catalog containing full information.

BUCKEYE ENGINE COMPANY Salem, Ohio

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This List is acknowledged to be the only complete work of its kind in existence, and one in great demand among manufacturers, who "follow up" their advertising through the mails.

You can secure a copy for your own use—a letter of request will bring the details.

The Automobile Trade Directory

243-49 West 39th Street : : : : New York, N. Y.

The Clear-Ahead Automobile Head Light Bracket

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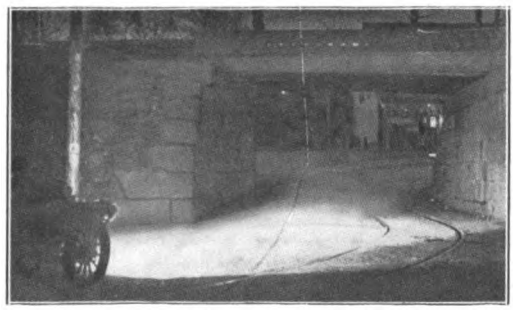
Adjustable to Any Make or Size of Car or Any Height of Lamp Used.

Special Equipment For Ford Cars

LIGHTS UP the Dark and Dangerous CURVES and HOLES

MAKING NIGHT DRIVING A PLEASURE



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Manufacturers and Dealers Write for Prices Today, Stating Whether Electric or Gas.

BLACK ENAMEL OR NICKEL

THE AUTO PROTECTOR COMPANY

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APPROXIMATE HORSE-POWER OF FOUR-CYCLE AUTOMOBILE ENGINES*

TABLE OF CONSTANTS FOR VARIABLE SPEEDS AND STROKES

Stroke in Ins.	Revolutions per Minute of Motor														
	500	550	600	650	700	750	800	850	900	950	1,000	1,050	1,100	1,150	1,200
2.00.....	.089	.098	.107	.116	.124	.134	.142	.153	.161	.169	.178	.187	.196	.205	.214
2.25.....	.100	.110	.120	.130	.140	.151	.160	.171	.181	.190	.200	.210	.220	.231	.241
2.50.....	.112	.125	.133	.145	.156	.167	.176	.189	.201	.212	.223	.233	.245	.257	.268
2.75.....	.123	.135	.146	.159	.172	.184	.196	.208	.221	.233	.245	.256	.270	.282	.295
3.00.....	.134	.147	.160	.174	.187	.201	.214	.227	.241	.254	.267	.279	.294	.308	.322
3.25.....	.145	.158	.173	.188	.203	.219	.232	.246	.261	.275	.289	.303	.319	.333	.349
3.50.....	.156	.173	.186	.203	.218	.234	.250	.265	.281	.296	.312	.326	.343	.359	.375
3.75.....	.167	.184	.200	.218	.234	.252	.266	.284	.301	.317	.334	.349	.368	.385	.401
4.00.....	.178	.196	.214	.232	.249	.268	.285	.303	.321	.339	.356	.373	.392	.411	.429
4.25.....	.189	.208	.227	.246	.264	.285	.303	.322	.341	.360	.378	.396	.416	.436	456
4.50.....	.200	.220	.240	.261	.280	.305	.321	.341	.361	.381	.400	.419	.441	.461	.485
4.75.....	.212	.233	.253	.275	.295	.319	.339	.360	.381	.402	.423	.443	.466	.486	.509
5.00.....	.223	.245	.266	.290	.312	.335	.357	.379	.401	.423	445	.466	.491	.512	.530
5.25.....	.234	.257	.279	.304	.327	.351	.375	.398	.421	.444	.467	.490	.515	.538	.563
5.50.....	.245	.270	.293	.318	.343	.368	.393	.417	.441	.465	.489	.513	.540	.564	.590
5.75.....	.258	.282	.307	.332	.369	.385	.410	.436	.461	.486	.512	.536	.564	.589	.616
6.00.....	.268	.294	.320	.348	.375	.402	.428	.455	.481	.508	.535	.559	.589	.615	.643

Bore in Ins.	Square of Bore
2.00	4.00
2.25	5.06
2.50	6.25
2.75	7.55
3.00	9.00
3.25	10.56
3.50	12.25
3.75	14.05
4.00	16.00
4.25	18.05
4.50	20.20
4.75	22.55
5.00	25.00
5.25	27.50
5.50	30.20
5.75	33.05
6.00	36.00

Rule:—Multiply number to right of bore by number in upper table at intersection of proper R.P.M. and stroke columns.

Example:—Find approximate horsepower developed by motor having 4.25″ bore and 5″ stroke at 800 revolutions per minute. Under 4.25 bore we find 18.05.

At intersection of 5″ stroke line and 800 R.P.M. column in upper table we find .357.

The product of these numbers gives the horsepower, thus:

Approximate horsepower = 18.05×.357 = 6.45 H.P.

These figures have been computed for the average M.E.P. as found in the ordinary motor car engine, but of course will vary with increase or decrease in compression and with different mechanical efficiencies.

*For multi-cylinder engines, multiply by number of cylinders. Above formula gives H. P. for only one cylinder.

Index to Tables and Data appears on Pages 23 to 26.

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BRAKE HORSEPOWER OF 2-CYCLE GASOLINE MOTORS

Determined by Tests of Marine Motors

HORSEPOWER OF 2 CYCLE ENGINES—ONE CYLINDER

	Bore and Stroke.	3 x 2½	3 x 3	3 x 3½	3 x 4	3½ x 3	3½ x 3½	3⅛ x 3¼
R.P.M...	300	.52	.62	.73	.83	.85	.99	.85
	400	.69	.83	.97	1.10	1.13	1.32	1.14
	500	.87	1.04	1.21	1.38	1.41	1.65	1.42
	600	1.04	1.25	1.45	1.66	1.70	1.97	1.71
	700	1.21	1.45	1.70	1.93	2.00	2.30	2.00
	800	1.38	1.65	1.94	2.20	2.26	2.62	2.28
	900	1.55	1.87	2.20	2.50	2.55	2.96	2.56
	1000	1.75	2.10	2.40	2.76	2.84	3.30	2.90
		4 x 3	3¾ x 3½	4 x 3½	3¾ x 4	3¾ x 3¾	4 x 4	4¼ x 4
R.P.M...	300	1.10	1.14	1.28	1.30	1.22	1.48	1.67
	400	1.47	1.50	1.72	1.73	1.62	1.97	2.22
	500	1.84	1.90	2.15	2.16	2.00	2.46	2.78
	600	2.20	2.30	2.58	2.60	2.44	2.94	3.34
	700	2.58	2.65	3.00	3.00	2.84	3.44	3.89
	800	2.94	3.00	3.42	3.45	3.24	3.92	4.45
	900	3.30	3.40	3.86	3.88	3.65	4.45	5.00
	1000	3.70	3.80	4.30	4.40	4.05	4.92	5.55
		4¼ x 4¼	4¾ x 4	4 x 5	4¼ x 4½	4½ x 4½	4½ x5	4½ x 5½
R.P.M...	300	1.77	2.08	1.85	1.87	2.10	2.34	2.58
	400	2.36	2.78	2.46	2.50	2.80	3.12	3.42
	500	2.95	3.46	3.07	3.12	3.50	3.90	4.30
	600	3.54	4.15	3.70	3.75	4.20	4.68	5.15
	700	4.13	4.85	4.30	4.37	4.90	5.45	6.00
	800	4.70	5.55	4.93	5.00	5.60	6.25	6.90
	900	5.30	6.20	5.50	5.60	6.30	7.00	7.70
	1000	5.90	6.90	6.15	6.25	7.00	7.80	8.60
		4¾ x 5	5 x 5	5 x 5¼	5 x 6	5¼ x 5½	5½ x 5	5¾ x 5
R.P.M...	300	2.60	2.88	3.00	3.46	3.44	3.50	3.80
	400	3.48	3.82	4.00	4.60	4.57	4.65	5.10
	500	4.35	4.80	5.05	5.75	5.70	5.80	6.35
	600	5.20	5.75	6.10	6.90	6.85	7.00	7.60
	700	6.10	6.70	7.05	8.05	8.15	8.15	8.90
	800	6.95	7.65	8.10	9.25	9.30	9.30	10.30
	900	7.80	8.65	9.20	....	10.50	10.50	11.40
	1000	8.70	9.60	10.00	....	....	11.60	12.70
		5½ x 5½	5½ x 6¼	5½ x 6½	6 x 6	6½ x 6½	6 x 7	
R.P.M...	300	3.84	4.35	4.50	4.95	6.30	5.80	....
	400	5.10	5.82	6.00	6.60	8.40	7.75	....
	500	6.40	7.25	7.60	8.30	10.50	9.70	....
	600	7.67	8.75	9.25	9.95	12.60	11.60	....
	700	9.00	10.20	10.60	11.60	14.70	13.50	....
	800	10.25	11.60	....	....	....	....	....
	900	11.50	....	....	....	....	....	....
	1000	....	....	....	....	....	....	....

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O'GORMAN'S HORSE-POWER REFERENCE TABLE

HORSE-POWER FROM BORE AND STROKE—FORMULA $KD^{1.6}S^{4}$.

To find the comparative horse-power number of a car, find the bore in mm. given in the extreme left-hand column and follow the horizontal line till you reach the column vertically below the stroke in mm. Thus, if the bore is 101.5 mm. and the stroke 114 mm. the horse-power number is 30.9. This is not the maximum power, but a representative figure for power.

Bore in MM.	Stroke in Millimetres															Bore in Inches
	55	57	60	63.5	65	70	75	76	80	82.5	85	89	90	95.2	100	
55	8.6	8.8	9	9.2	9.3	9.5	9.8	9.8	10	10.2	10.3	10.5	10.0	10.8	11	2 5/32
57	9.25	9.3	9.5	9.8	9.9	10.2	10.5	10.5	10.75	10.8	11	11.1	11.2	11.5	11.75	2 1/4
63.5	11	11.1	11.25	11.5	11.5	12	12.3	12.4	12.6	12.8	13	13.2	13.25	13.5	13.8	2 1/2
65	11.2	11.3	11.6	11.8	12	12.3	12.7	12.8	13	13.2	13.4	13.6	13.7	14.0	14.3	2 9/16
70	12.75	12.9	13.2	13.4	13.5	14	14.5	14.5	14.75	14.9	15.2	15.4	15.5	15.8	16	2 3/4
75	14.2	14.3	14.6	15	15.1	15.5	16	16.1	16.5	16.7	16.9	17.2	17.3	17.7	18.1	2 15/16
76	14.5	14.8	15	15.4	15.5	16	16.5	16.6	17	17.1	17.4	17.7	17.75	18.2	18.5	3
80	15.7	16	16.2	16.6	16.8	17.3	17.8	17.9	18.3	18.5	18.8	19.1	19.2	19.6	20	3 9/64
82.5	16.4	16.6	17	17.3	17.5	18	18.6	18.7	19	19.3	19.5	19.9	20	20.5	20.8	3 1/4
89	18.7	18.9	19.3	19.7	20	20.5	21	21.2	21.6	21.9	22.2	22.6	22.7	23.2	23.7	3 1/2
90	19.1	19.3	19.7	20.2	20.25	21	21.6	21.7	22.1	22.4	22.7	23.1	23.3	23.8	24.3	3 17/32
95.2	20.9	21.1	21.6	22	22.25	22.9	23.55	23.7	24.2	24.5	24.75	25.2	25.4	25.9	26.4	3 3/4
100	22.5	22.8	23.2	23.8	24	24.7	25.5	25.6	26.2	26.5	26.9	27.3	27.4	28	28.6	3 15/16
101.5	23	23.4	23.9	24.4	24.6	25.4	26	26.2	26.75	27.1	27.5	27.9	28	28.66	29.25	4
105	24.5	24.9	25.3	26	26.2	27	27.9	28	28.6	28.9	29.3	29.8	30	30.6	31.3	4 1/8
108	25.25	25.6	26.2	26.8	27.2	28	28.8	29	29.6	29.9	30.3	30.8	31	31.66	32.3	4 1/4
114.5	.....	.....	.....	29.7	29.8	30.6	31.5	31.6	32.25	32.6	33	33.6	33.8	34.5	35.3	4 1/2
115	28.3	28.8	29.3	30.3	30.3	31.2	32.1	32.3	32.9	33.3	33.7	34.3	34.5	35.2	36	4 17/32
120	30.4	30.7	31.3	32.3	32.8	33.2	34	34.3	35	35.4	35.9	36.5	36.7	37.5	38.3	4 3/4
125	31.8	32.2	32.8	34	34	35	36	36.2	36.9	37.4	37.8	38.5	38.7	39.6	40.4	4 15/16
127	33.2	33.5	34.3	35.2	35.3	36.3	37.3	37.6	38.3	38.8	39.25	40.0	40.2	41	41.8	5
130	34.1	34.6	35.2	36.4	36.4	37.5	38.6	38.8	39.5	40	40.5	41.1	41.3	42.3	43.2	5 1/8
		2 1/4		2 1/2		2 3/4		3		3 1/4		3 1/2		3 3/4		
	Stroke in Inches															

Bore in MM.	Stroke in Millimetres															Bore in Inches
	101.5	105	108	110	114	115	120	125	127	130	133	135	139	140	145	
55	11.1	11.2	11.3	11.4	11.6	11.7	11.8	12	12.1	12.2	12.3	....	.....	.....	.....	2 5/32
57	11.7	12	12	12.2	12.3	12.4	12.5	12.75	12.8	13	13.1	....	.....	.....	.....	2 1/4
63.5	13.9	14.1	14.2	14.4	14.5	14.6	14.8	15	15.2	15.4	15.5	....	.....	.....	.....	2 1/2
65	14.4	14.6	14.8	14.9	15.2	15.3	15.5	15.7	15.8	15.9	16.1	....	.....	.....	.....	2 9/16
70	16.2	16.5	16.6	16.75	17	17	17.4	17.6	17.7	18	18.1	....	.....	.....	.....	2 3/4
75	18.2	18.4	18.6	18.8	19	19.1	19.4	19.7	19.8	20	20.2	....	.....	.....	.....	2 15/16
76	18.6	18.9	19.1	19.2	19.4	19.5	19.85	20.2	20.3	20.5	20.7	....	.....	.....	.....	3
80	20.0	20.4	20.6	20.8	21	21.2	21.5	21.8	21.9	22.2	22.4	....	.....	.....	.....	3 9/64
82.5	20.9	21.2	21.4	21.6	21.9	22	22.35	22.7	22.8	23.0	23.3	....	.....	.....	.....	3 1/4
89	23.8	24.1	24.4	24.55	24.9	25	25.4	25.8	26	26.2	26.5	....	.....	.....	.....	3 1/2
90	24.4	24.7	25	25.2	25.5	25.6	26.0	26.5	26.6	26.9	27.2	....	.....	.....	.....	3 17/32
95.2	26.6	26.9	27.2	27.45	27.9	28	28.4	28.9	29.0	29.4	29.7	....	.....	.....	.....	3 3/4
100	28.8	29.2	29.4	29.7	30	30.2	30.8	31.2	31.4	31.7	31.9	....	.....	.....	.....	3 15/16
101.5	29.4	29.85	30.2	30.4	30.9	31	31.5	32	32.2	32.6	32.9	33	33.5	33.5	34	4
105	31.4	31.4	32.2	32.5	33	33.1	33.7	34.2	34.4	34.8	35.1	35.2	35.8	35.9	36.3	4 1/8
108	32.5	33	33.3	33.5	34	34.2	34.75	35.3	35.5	35.9	36.2	36.4	36.8	37	37.5	4 1/4
114.5	35.5	36	36.3	36.6	37.2	37.3	37.9	38.6	38.8	39.2	39.6	39.8	40.3	40.4	41	4 1/2
115	36.1	36.1	37	37.4	37.9	38	38.7	39.3	39.5	39.9	40.3	40.5	41.1	41.2	41.8	4 17/32
120	38.5	39	39.5	39.8	40.4	40.6	41.3	42	42.2	42.7	43	43.3	44	44	44.6	4 3/4
125	40.6	41.2	41.6	42	42.5	42.7	43.5	44.2	44.4	44.8	45.3	45.4	46.1	46.3	46.9	4 15/16
127	42.0	42.7	43.1	43.5	44.0	44.25	45	45.75	46	46.5	46.9	47.2	47.8	48	48.6	5
130	43.4	44	44.5	45	45.5	45.7	46.5	47.3	47.5	48	48.5	48.7	49.4	49.6	50.2	5 1/8
	4		4 1/4		4 1/2		4 3/4		5		5 1/4		5 1/2			
	Stroke in Inches															

(Table continued on page 584)

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O'GORMAN'S HORSE-POWER TABLE (Continued)

Bore in MM.	Stroke in Millimetres															Bore in Inches
	146	150	152	155	158	160	165	170	171	175	178	180	184	185	190	
55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25/32
57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2¼
63.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2½
65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 9/16
70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2¾
75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 15/16
76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 9/64
82.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3¼
89	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3½
90	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 17/32
95.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3¾
100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 15/16
101.5	34.1	34.5	34.7	35	35.2	35.4	35.8	36.2	36.3	36.7	36.9	37	.....	37.4	.....	4
105	36.4	36.8	37	37.3	37.5	37.7	38	38.5	38.6	38.9	39.1	39.3	.....	39.6	.....	4⅛
108	37.6	38	38.2	38.5	38.8	39	39.5	39.9	40	40.4	40.6	40.8	.....	41.2	.....	4¼
114.5	41.2	41.5	41.8	42	42.5	42.6	43.2	43.7	43.8	44	44.4	44.6	.....	45	.....	4½
115	41.9	42.3	42.6	43	43.4	43.6	44	44.6	44.7	45.1	45.3	45.5	.....	45.9	.....	4 17/32
120	44.7	45.2	45.5	45.8	46.2	46.4	47	47.5	47.6	48	48.3	48.6	.....	49	.....	4¾
125	47	47.5	47.9	48.3	48.7	48.9	49.5	50.1	50.2	50.6	50.9	51.2	.....	51.6	.....	4 15/16
127	48.7	49.3	49.5	50	50.4	50.5	51.2	51.8	52	52.4	52.8	53	.....	53.5	.....	5
130	50.2	50.8	51.2	51.6	52	52.2	52.8	53.5	53.6	54.2	54.4	54.7	.....	55.2	.....	5⅛
	5¾		6		6¼		6½		6¾		7			7¼	7½	
	Stroke in Inches															

A. L. A. M. STANDARD HORSE-POWER FORMULA

(Bore of Cylinder Squared x No. of Cylinders, ÷ 2.5)

Bore		Horse Power			
Inches	Mill	1 Cyl.	2 Cyl.	4 Cyl.	6 Cyl.
2½	64	2½	5	10	15
2⅝	68	2¾	5½	11	16½
2¾	70	3	6	12 1/10	18⅕
2⅞	73	3 5/16	6⅝	13¼	19⅞
3	76	3⅗	7⅕	14⅖	21⅗
3⅛	79	3 15/16	7 13/16	15⅝	23 7/16
3¼	83	4¼	8½	16 9/10	25⅖
3⅜	85	4 9/16	9⅛	18¼	27⅖
3½	89	4 9/10	9⅘	19⅗	29⅖
3⅝	92	5¼	10½	20¼	31⅗
3¾	95	5⅝	11¼	22½	33¾
3⅞	99	6	12	24	36 1/16
4	102	6⅖	12⅘	25⅗	38⅖
4⅛	105	6 13/16	13⅝	27¼	40 9/10
4¼	108	7¼	14½	28 9/10	43⅕
4⅜	111	7⅝	15 5/16	30⅝	45 15/16
4½	114	8 1/10	16⅕	32⅖	48⅗
4⅝	118	8 9/16	17⅛	34¼	51⅗
4¾	121	9	18	36 1/10	54 1/10
4⅞	124	9½	19	38	57
5	127	10	20	40	60
5⅛	130	10½	21	42	63
5¼	133	11	22	44 1/10	66⅕
5⅜	137	11 9/16	23	46	69 1/10
5½	140	12 1/10	24⅕	48⅖	72⅗
5⅝	143	12⅝	25 5/16	50⅝	75 15/16
5¾	146	13¼	26½	53	79½
5⅞	149	13 13/16	27⅝	55¼	82 9/10
6	152	14⅖	28⅘	57⅗	86⅖

Computed at 1,000 feet per minute piston speed.

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TUBING FOR ALL PURPOSES
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MEAN EFFECTIVE PRESSURES

In standard modern vehicle motors the mean effective pressure is about 5 kilograms per square centimeter (71 pounds per square inch). This pressure has increased since the beginning of the automobile industry but in a lesser proportion than the speed. It varies with the size of the motor. Thus, in a current type of motor with 60x120 mm. cylinders (2.4x4.8 inches), it attains 4 kilograms (57 pounds per square inch). In a motor of 80x130 mm. (3.2x5.2 in.) it is about 5 kilograms (71 pounds per square inch), and in a motor of 110x140 mm. (4.4x5.6 inches) it is about 6 kilograms (85 pounds), all other things being equal. This at 1,000 revolutions per minute.

The mean effective pressure increases as the result of increased compression. It decreases as the number of revolutions per minute increases.

The thermal efficiency of a motor, by which is understood the ratio between the work done and the thermal energy contained in the fuel consumed, is in the neighborhood of 14 to 15 per cent., corresponding to a fuel consumption of one-eighth of a gallon per horse-power hour. The mechanical efficiency, by which is understood the ratio between the work actually done to the energy expended on the piston by the expanding gases, is approximately 70 per cent. The efficiency of transmission, that is, the ratio of the work done at the wheel rims to that delivered at the crank shaft, is generally taken as 75 per cent.—Translated from "La Locomotion," by "*The Horseless Age.*"

MEAN EFFECTIVE PRESSURES

DISREGARDING MECHANICAL LOSSES

Make	Cylinders	Horse-power	Revolutions per Minute	Mean Effective Pressure
Daimler	Four 124x130 mm	58.0	1,172	106.8
National	Four 5x5 11/16 in	64.0	1,400	81.1
National	Four 5x5 11/16 in	54.1	1,055	90.9
Pierce	Six 4x4¾ in	44.5	1,263	76.1
Pierce	Six 4x4¾ in	30.9	800	85.4
Rambler	Four 5x5½ in	43.5	1,091	73.1
Rambler	Four 5x5½ in	40.0	900	81.3
Rambler	Four 4½x4½ in	34.0	1,333	72.2
Rambler	Four 4½x4½ in	29.0	900	89.2
Thomas	Six 4¼x5½ in	49.0	1,091	76.0
Thomas	Six 4¼x5½ in	34.5	700	83.4

*Fitted with Knight-Daimler sleeve valve engine.

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Pierce-Arrow	fires	1-5-3-6-2-4
Winton	"	1-5-3-6-2-4
Lozier	"	1-2-3-6-5-4
Peerless	"	1-3-2-6-4-5
Matheson	"	1-4-2-6-3-5
Stevens-Duryea	"	1-4-2-6-3-5
Knox	"	1-5-3-6-2-4
Alco	"	1-4-2-6-3-5
Thomas (K)	"	1-4-2-6-3-5
Thomas (L)	"	1-3-5-6-4-2
Franklin	"	1-4-2-6-3-5

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4 Sanford Street Bradford, Pa.

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TOLERANCE TABLE FOR RADIAL BALL BEARINGS

BORE

M.M. Diam.	M.M.	M.M.
6 to 10,5	+0	−0,008
11 to 18	+0	−0,01
19 to 30	+0	−0,012
31 to 48	+0	−0,014
49 to 75	+0	−0,016
76 to 115	+0	−0,018
116 to 175	+0	−0,02
176 to 400	+0	−0,025

OUTSIDE

M.M. Diam.	M.M.	M.M.
6 to 10,5	+0	−0,003
11 to 18	+0	−0,004
19 to 30	+0	−0,005
31 to 48	+0	−0,006
49 to 75	+0	−0,008
76 to 115	+0	−0,01
116 to 175	+0	−0,012
176 to 265	+0	−0,015
266 to 400	+0	−0,02

WIDTH

+0,01 M.M. −0,01

VARIATION OF VOLUME AND TEMPERATURE WITH COMPRESSION

Gauge Pressure	Volume	Temperature
0	1.000	60
2	.910	80.4
5	.810	106
10	.690	145
20	.543	207
30	.454	252
40	.393	302
50	.350	339
75	.276	420
100	.232	485
115	.213	518
130	.197	550
145	.184	580
160	.172	607
175	.163	632
200	.149	672

The foregoing table is based on the assumption that no heat is added or subtracted.

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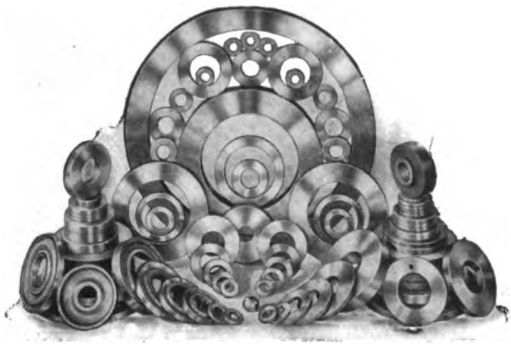

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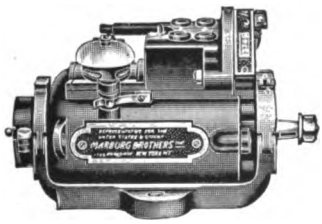

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TABLE OF CRANK ANGLES AND CORRESPONDING PISTON POSITIONS

Out denotes the stroke towards the crankshaft.
In denotes the stroke away from the crankshaft.

Crank Angles in Degrees	Connecting Rod to Crank Ratio = 4		Connecting Rod to Crank Ratio = 4.5		Connecting Rod to Crank Ratio = 5	
	Out	In	Out	In	Out	In
2	.0004	.0002	.0004	.0003	.0004	.0003
4	.0015	.0010	.0015	.0010	.0015	.0010
6	.0034	.0021	.0033	.0021	.0033	.0022
8	.0061	.0036	.0060	.0038	.0058	.0039
10	.0095	.0057	.0092	.0059	.0091	.0061
12	.0136	.0082	.0133	.0087	.0131	.0088
14	.0185	.0112	.0181	.0116	.0178	.0119
16	.0241	.0146	.0236	.0152	.0232	.0156
18	.0304	.0185	.0298	.0192	.0293	0197
20	.0375	.0228	.0367	.0237	.0360	.0243
22	.0452	.0276	.0442	.0286	.0434	.0294
24	.0536	.0329	.0524	.0340	.0515	.0349
26	.0627	.0385	.0613	.0399	.0602	.0410
28	.0724	.0447	.0708	.0462	.0696	.0475
30	.0827	.0513	.0809	.0531	.0796	.0545
32	.0936	.0583	.0916	.0603	.0901	.0619
34	.1051	.0658	.1029	.0680	.1012	.0698
36	.1172	.0738	.1147	.0762	.1128	.0782
38	.1298	.0822	.1271	.0848	.1250	.0870
40	.1430	.6910	.1400	.0939	.1377	.0962
42	.1565	.1002	.1534	.1034	.1509	.1059
44	.1707	.1099	.1673	.1134	.1646	.1161
46	.1853	.1201	.1816	.1237	.1787	.1267
48	.2003	.1306	.1963	.1345	.1392	.1377
50	.2156	.1416	.2115	.1458	.2081	.1491
52	.2314	.1530	.2270	.1574	.2234	.1609
54	.2474	.1648	.2428	.1695	.2391	.1732
56	.2638	.1769	.2589	.1819	.2550	.1858
58	.2805	.1896	.2754	.1947	.2713	.1988
60	.2974	.2026	.2920	.2079	.2878	.2122
62	.3146	.2159	.3090	.2215	.3046	.2260
64	.3320	.2297	.3262	.2355	.3215	.2401
66	.3495	.2438	.3435	.2498	.3387	.2545
68	.3672	.2582	.3610	.2644	.3561	.2693
70	.3850	.2730	.3786	.2794	.3735	.2844
72	.4028	.2881	.3963	.2947	.3911	.2998
74	.4208	.3036	.4141	.3103	.4088	.3155
76	.4388	.3193	.4319	.3261	.4266	.3315
78	.4568	.3353	.4498	.3422	.4444	.3477
80	.4747	.3516	.4677	.3586	.4622	.3642
82	.4927	.3682	.4857	.3753	.4799	.3809
84	.5105	.3849	.5034	.3921	.4977	.3978
86	.5283	.4019	.5211	.4091	.5154	.4149
88	.5460	.4191	.5388	.4263	.5330	.4321
90	.5635	.4365	.5563	.4437	.5505	.4495
92	.5802	.4540	.5737	.4612	.5670	.4670
94	.5981	.4787	.5909	.4789	.5851	.4846
96	.6151	.4895	.6079	.4966	.6022	.5028
98	.6318	.5073	.6247	.5143	.6191	.5201
100	.6484	.5253	.6414	.5323	.6358	.5378
102	.6647	.5432	.6578	.5502	.6523	.5556
104	.6807	.5612	.6739	.5681	.6685	.5734
106	.6964	.5792	.6897	.5859	.6845	.5912
108	.7119	.5972	.7053	.6037	.7002	.6082
110	.7270	.6150	.7206	.6214	.7156	.6265
112	.7418	.6328	.7356	.6390	.7307	.6439
114	.7562	.6505	.7502	.6565	.7455	.6613

(Continued on page 592)

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Crank Angles in Degrees	Connecting Rod to Crank Ratio=4		Connecting Rod to Crank Ratio=4.5		Connecting Rod to Crank Ratio=5	
	Out	In	Out	In	Out	In
116	.7703	.6680	.7645	.6738	.7599	.6785
118	.7841	.6854	.7785	.6910	.7740	.6954
120	.7974	.7026	.7921	.7080	.7878	.7122
122	.8104	.7195	.8053	.7246	.8012	.7287
124	.8230	.7362	.8181	.7411	.8142	.7450
126	.8352	.7526	.8305	.7572	.8268	.7609
128	.8470	.7686	.8426	.7730	.8391	.7766
130	.8584	.7844	.8542	.7885	.8509	.7919
132	.8694	.7997	.8655	.8037	.8623	.8068
134	.8799	.8147	.8763	.8184	.8733	.8213
136	.8901	.8293	.8866	.8327	.8839	.8354
138	.8998	.8434	.8966	.8466	.8941	.8491
140	.9090	.8570	.9061	.8600	.9038	.8623
142	.9178	.8702	.9152	.8729	.9130	.8750
144	.9262	.8828	.9238	.8853	.9218	.8872
146	.9342	.8949	.9320	.8971	.9302	.8988
148	.9417	.9064	.9397	.9084	.9381	.9099
150	.9487	.9173	.9469	.9191	.9455	.9204
152	.9553	.9276	.9538	.9292	.9525	.9304
154	.9617	.9373	.9601	.9387	.9590	.9398
156	.9671	.9464	.9660	.9476	.9651	.9485
158	.9724	.9548	.9714	.9558	.9706	.9566
160	.9772	.9625	.9763	.9633	.9757	.9640
162	.9815	.9696	.9806	.9702	.9803	.9707
164	.9854	.9759	.9848	.9764	.9844	.9767
166	.9888	.9815	.9884	.9819	.9881	.9822
168	.9918	.9864	.9913	.9867	.9912	.9869
170	.9943	.9905	.9941	.9908	.9939	.9909
172	.9963	.9939	.9962	.9940	.9961	.9942
174	.9979	.9966	.9979	.9967	.9978	.9967
176	.9990	.9985	.9990	.9985	.9990	.9985
178	.9998	.9996	.9997	.9996	.9097	.9996
180	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

This table should be useful for engine timing and for port design in two-cycle engines. The quantities are expressed in fractions of the stroke.

RACING OF MOTOR AT HIGH SPEEDS

Experiments were conducted by S. F. Edge at the Brooklands (England) track to determine whether the motor of an automobile "races" through the road (driving) wheels leaving the ground on rough roads and at high speeds. A Napier car was used. With high gear engaged, the car was towed a complete lap of the Brooklands track, a distance of approximately 2⅝ miles, and the number of revolutions of the motor was found to be 3,372. Towing was effected following the 50-foot line of the track and the subsequent tests of the car under its own power were made on or about this line. Following is a tabulated result of the several tests:

Test	Distance (about 2⅝ miles)	Speed in Miles per Hour	Engine Revolutions	Total Slip (in Engine Revs.)
1	1 lap 2⅝ miles	Car towed	3,732	
2	1 lap 2⅝ miles	Driven very slow speed	3,748	16
3	1 lap 2⅝ miles	Driven 20	3,776	44
4	1 lap 2⅝ miles	Driven 30	3,772	40
5	1 lap 2⅝ miles	Driven 40	3,770	38
6	1 lap 2⅝ miles	Driven 50	3,780	58
7	1 lap 2⅝ miles	Driven 60	3,804	72

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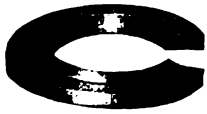
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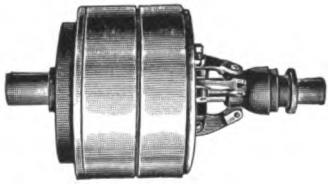
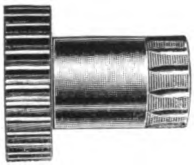


Sliding Transmissions



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WIND RESISTANCE

Dating back to the time of Smeaton various formulas have been used for determining the relation between wind pressure and velocity as affecting the stability of buildings and other exposed structures. Smeaton's table, which is largely used at the present day, is as follows:

Miles per Hour	Feet per Second	Pressure per sq. ft. in Pounds	Wind Called
1	1.47	0.005	Hardly perceptible.
2	2.93	0.020	Just perceptible.
3	4.4	0.044	
4	5.87	0.079	
5	7.33	0.123	Gentle pleasant wind.
6	8.8	0.177	
7	10.25	0.241	
8	11.75	0.315	
9	13.2	0.400	
10	14.67	0.492	
12	17.6	0.708	Pleasant brisk gale.
14	20.5	0.964	
15	22.00	1.107	
16	23.45	1.25	
18	26.4	1.55	
20	29.34	1.968	Very brisk.
25	36.67	3.075	
30	44.01	4.429	High wind.
35	51.34	6.027	
40	58.68	7.873	
45	66.01	9.963	Very high storm
50	73.35	12.30	
55	80.7	14.9	
60	88.02	17.71	
66	95.4	20.85	Great storm.
70	102.5	24.1	
75	110.	27.7	Hurricane.
80	117.36	31.49	
100	146.67	49.2	Immense hurricane.

The foregoing table is applicable to automobile work assuming that the machine is moving in still air at the varying rates of speed given in miles per hour. It is generally admitted that the Smeaton formula gives results too high. The formula is $P=0.005\ V^2$. Other and more recent formulas are those of Martin, $P=0.004\ V^2$, and Dines, $P=0.0029\ V^2$. At a rate of speed of 60 miles an hour these formulas give the following results in pounds per square foot: Smeaton, 18; Martin, 14.4; Dines, 10.44.

In the case of pleasure cars the wind resistance at ordinary rates of speed is so low that it does not greatly influence design while in the case of racing machines many ingenious forms of construction have been tried out with a view to the reduction of the loss from this source.

POWER REQUIRED TO OVERCOME WIND RESISTANCE (FORREST JONES)

A formula for use in approximating the power required to overcome wind resistance is given as follows:

$$HP = \frac{PA\ (M\ 5{,}280 \mid 60)}{33{,}000} = 0.00267\ PAM$$

In which HP = Horsepower required to overcome wind resistance
P = Pressure of wind in pounds per square foot.
A = Front area of body in square feet.
M = Speed of car in miles per hour.

Numerical example:

Assuming a car with a front area of 10 square feet and a speed of 60 miles per hour, the power required to overcome this wind resistance will be:

$$HP = \frac{13 \times 10\ (60 \times 5{,}280 \mid 60)}{33{,}000} = 20.8$$

It is not believed that this formula will hold out for all ranges in speed, nor can it be said with certainty that the front area total will be correctly stated if the areas of all the parts without respect to shape or location are figured in on the same basis. In all probability, the most certain way to ascertain the amount of power required to overcome wind resistance is to take a certain car and with suitable instrument under road conditions measure the power required

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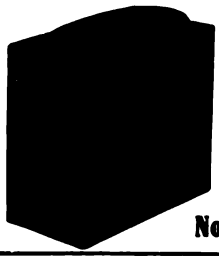

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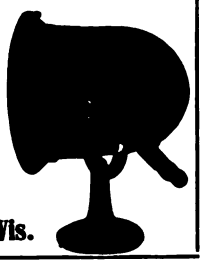

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MEDFORD, MASS.

Manufacturers of

"ESS, ESS" CARBURETERS

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DIMENSIONS AND LIFT OF POPPET VALVES FOR A GIVEN SIZE OF OPENING

D = Smaller diameter of valve seat.
d = diameter of piping to which valve opening must correspond.

$$r = \frac{D}{d}$$

FLAT-SEATED VALVES.

For $r = 1$ Lift $= d \times 0.250 = D \times 0.250$.
" $r = 1.25$ " $= d \times 0.200 = D \times 0.160$.
" $r = 1.5$ " $= d \times 0.166 = D \times 0.111$.
" $r = 2$ " $= d \times 0.125 = D \times 0.162$.
" $r = 2.5$ " $= d \times 0.100 = D \times 0.040$.

CONE-SEATED VALVES; 45° ANGLE OF CONE.

For $r = 1$ Lift $= d \times 0.307 = D \times 0.307$.
" $r = 1.25$ " $= d \times 0.256 = D \times 0.205$.
" $r = 1.5$ " $= d \times 0.219 = D \times 0.146$.
" $r = 2$ " $= d \times 0.170 = D \times 0.084$.
" $r = 2.5$ " $= d \times 0.138 = D \times 0.055$.

It will be noted that cone-seated valves require a lift from one-fifth to one-quarter greater than the corresponding flat-seated valves.

The proportions of lift given in connection with flat-seated valves are geometrically correct. It should, however, be borne in mind that flat-seated valves generally introduce a certain amount of wire drawing of the incoming charge. A slight increase over the theoretically correct lifts should consequently be provided. A definite coefficient cannot be given, as this will depend considerably upon the valve seat and valve chest design as well as upon the proportions of the fillet between valve stem and valve head. The matter is one of personal intuition by the designer; in the best French designs the extra allowance seldom exceeds 25 per cent. of the theoretical lift. It is well to so arrange the contour of the valve and valve chamber profiles that a minimum of lift be required, as this is favorable to silence in running and to flexibility.

FORMULA FOR PISTON VELOCITY

The ratio of connecting rod length to stroke influences the velocity of the pistor and the following will hold: Let,

l = eccentricity of crank (half the stroke);
L = length of connecting rod;
v = linear velocity of crank-pin;
θ = crank angle;
S = piston velocity in feet per minute:
r = ratio;

.hen,

$$r = \frac{l}{L}$$

and,

$$S = v(\sin\theta \times l/2a \sin 2\theta)$$

In the above expression for the piston velocity, all terms higher than 2θ are neglected because of their small value, which affects the result little, and only makes the formula cumbersome.

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We are pioneers in Perfect Carburetion

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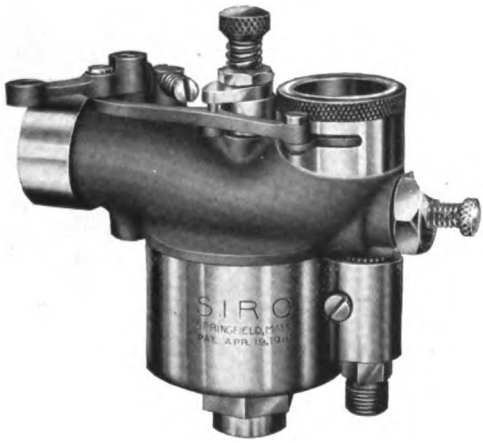

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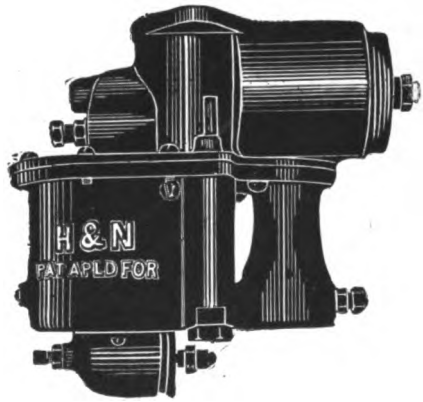

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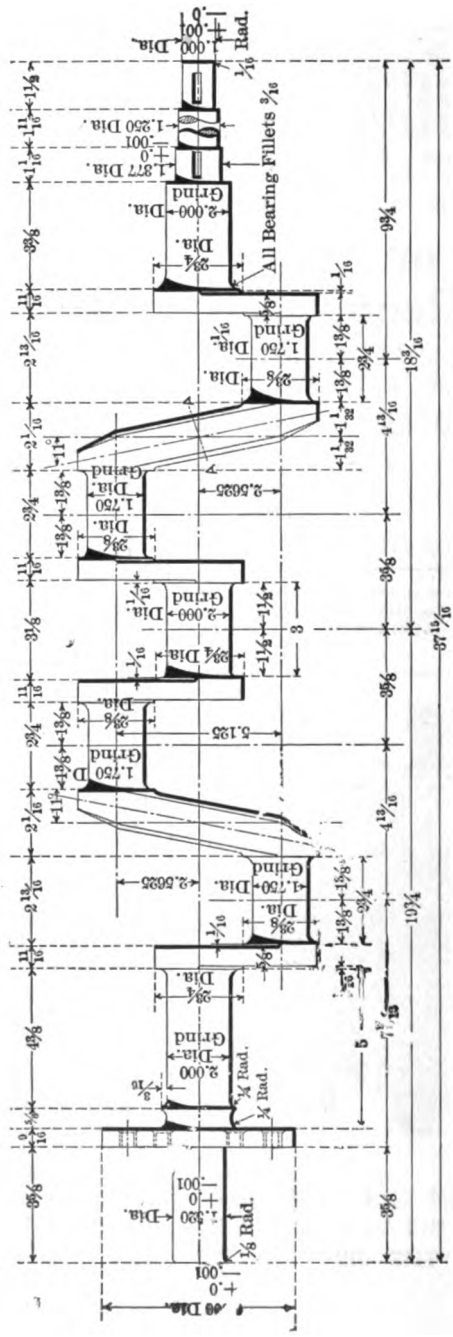

COMPLETELY DIMENSIONED DRAWING OF TYPICAL FOUR-THROW AUTOMOBILE MOTOR CRANK SHAFT

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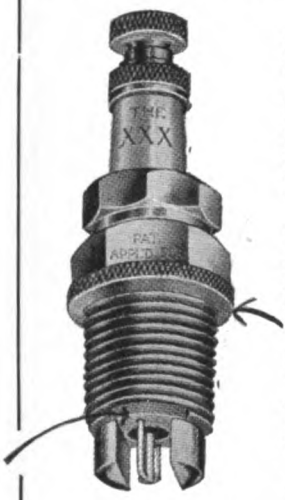
The XXX Spark Plug



The final answer to spark plug difficulty—*the detachable electrode.* The detachable electrode can be withdrawn completely cleaning the spark plug or, if it becomes broken can be readily replaced by a new one.

Another feature of the XXX Spark Plug is its adjustable collar which can be adapted to a cylinder wall of any thickness.

The XXX Spark Plug is making a tremendous sales record. Dealers and car manufacturers will find it of the utmost interest.

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ANDERSON

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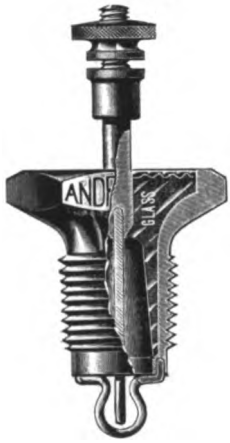
A WELD OF GLASS AND STEEL



A WINDOW TO THE ENGINE

Better pay $1.50 once than a dollar a dozen times. That's about the ratio of Anderson Spark Plug life, compared with ordinary plugs.

ALL SIZES

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Then there are others, whose big aim is to make as much money as they can on each sale, regardless of value given or anything else.

You, Mr. Manufacturer, must belong to one of these two classes—there is no go-between.

Is it the latter? If so, then we cannot do business with you. But if you are trying to build a car that will make your name echo through the ages, we respectfully submit for your 1914 consideration

BENFORD'S Monarch Spark Plug

It will add the last touch of perfection to your motor, and will make it run like a top.

Don't take our word for this! Make us show you.

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In its 20th Year

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Absolutely Soot-proof

Double, Unbreakable Stone Insulation, instead of cracking porcelain; Four Sparking Points of Platinum-alloy; Self-cleaning Construction; and a Full Year's Absolute Guarantee—these are the features which account for the preference of experienced motorists for HERZ PLUG.

The Plug the users want is the Plug that pays the dealer. That means HERZ PLUG.

HERZ & CO. New York

Makers of HERZ MAGNETO

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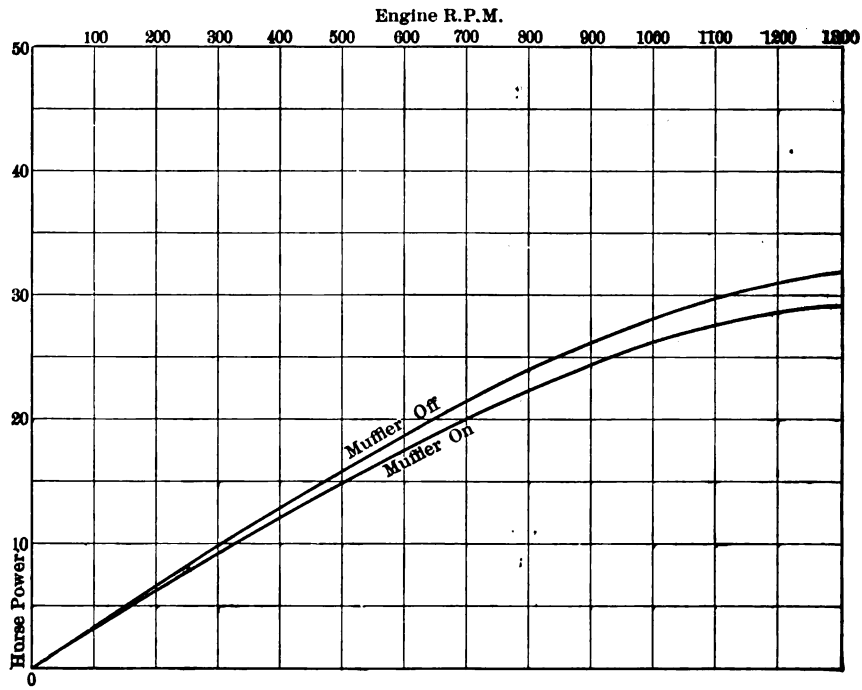
POWER LOSS DUE TO USE OF MUFFLER ON FOUR-CYLINDER AUTOMOBILE MOTOR

TEST CONDUCTED BY RAMBLER TESTING LABORATORY

Engine R.P.M.	Test No. 724 Horse Power Muffler	Test No. 724 Horse Power No Muffler	Test No. 724 Loss	Test No. 730 Horse Power Muffler	Test No. 730 Horse Power No Muffler	Test No. 730 Loss
600	17.6	18.9	1.3	17.4	18.6	1.2
700	20.0	21.5	1.5	19.8	21.2	1.4
800	22.3	24.0	1.7	22.1	23.8	1.7
900	24.3	26.2	1.9	24.3	26.1	1.8
1,000	26.1	28.1	2.0	26.1	28.1	1.9
1,100	27.5	29.7	2.2	27.6	29.7	2.1
1,200	28.6	30.9	2.3	28.6	30.8	2.2
1,300	29.3	31.8	2.5	29.2	31.6	2.4



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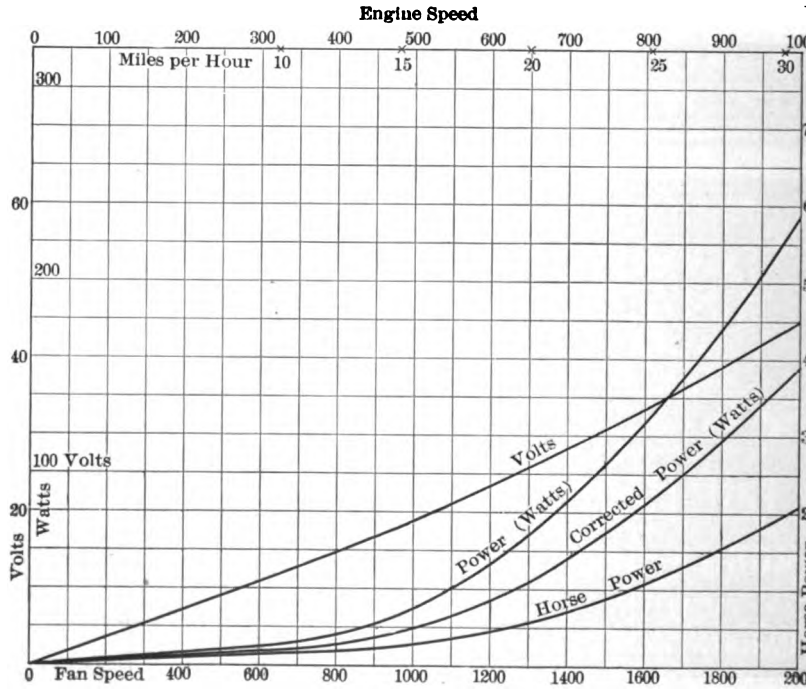
POWER CONSUMPTION TEST OF FOUR-CYLINDER AUTOMOBILE MOTOR COOLING FAN

CONDUCTED BY RAMBLER TESTING LABORATORY

Car Speed	R.P.M.		Power	R.P.M.	Corrected Power Curve Net		
M.P.H.	Engine	Fan	Watts	Correction	R.P.M.	Watts	H.P.
5	162	324	5	40	284	40	.00536
10	324	648	9	81	567	80	.0107
15	486	972	28	130	842	17.5	.0235
20	648	1,296	68	178	1,122	43.0	.0576
25	810	1,620	133	215	1,405	87.5	.117
30	972	1,944	224	270	1,674	146.0	.195

Fan run by separately excited motor.



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TRANSMISSION EFFICIENCY OF DIFFERENT TYPES OF MECHANISM (WORBY BEAUMONT)

Source of Loss of Power	Amount of Loss Per Cent.	Efficiency Per Cent.
		100
When driving direct:		
One chain	3.0	....
One and one-half pairs of bearings	7.5	89.5
With epicylic speed gear in operation, add	15.0	74.5
When driving direct:		
One set of gear	5.0	....
Two pairs of bearings	10.0	....
Partially active bearings	3.0	82.0
With change-speed reduction gear in operation, add	12.0	70.0
One set of gear	5.0	....
Three pairs of bearings	15.0	....
Equivalent of two chains	6.0	74.0
Two sets of gear	10.0	....
Four pairs of bearings	20.0	70.0
Two sets of gear	10.0	....
Five pairs of bearings	25.0	....
Equivalent of one chain	3.0	62.0
Equivalent of three sets of gear	15.0	....
Five pairs of bearings	25.0	60.0

TRACTION EFFORT ON VARIOUS SURFACES (NORRIS)

On rails or plates	5.16	pounds per ton
Asphalt or hardwood	12.24	" " "
Macadam	30.60	" " "
Loose gravel	140 to 200	" " "
Sand	400	" " "
With different tires (comparatively):		
Iron	60	" " "
Solid Rubber	60	" " "
Pneumatic	45	" " "

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WORK DONE BY CLUTCH AND BRAKES (C. H. TAYLOR)

Energy absorption of the clutch in accelerating a motor vehicle, assuming the ideal condition of uniform acceleration

$$W = \frac{MV\,(2Q - FV)}{2(F - Mg\theta)}$$

and

$$w = Q - \frac{FV}{2}$$

$$f = \frac{MV}{F - Mg\theta}$$

where W = total energy absorbed by clutch in accelerating the mass M from zero to V ft. per second when coupled with a motor developing Q foot-pounds per second; w = energy per second absorbed by clutch under the above conditions $= \frac{W}{f}$ where f = time required for acceleration in seconds. θ = tangent of the grade angle, or the per cent. of grade; F = accelerative force applied by the propelling system; g = gravity = 32.2. Also.

$$W = MV\left(\frac{Q}{F} - \frac{V}{2}\right)$$

here $\theta = o$ and

$$f = \frac{MV}{F}.$$

Energy required to be absorbed by the brakes when stopping a motor vehicle, on the level, from full speed is equal to

$$E = \frac{MV^2 + Mg\theta fV}{2}$$

$$f = \frac{MV}{F - Mg\theta}$$

using the same symbols as for the clutch formula, but applied to retardation instead of acceleration

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POWER CONSUMED IN MOVING A PLANE SURFACE AT DIFFERENT VELOCITIES IN THE OPEN AIR (KEMPE)

SPEED IN		Horse-power per Square Foot of Effective Surface	SPEED IN		Horse-power per Square Foot of Effective Surface
Miles per Hour	Feet per Minute		Miles per Hour	Feet per Minute	
10	880	0.013	50	4,400	1.64
15	1,320	0.044	75	6,600	5.54
20	1,760	0.105	100	8,800	13.13
25	2,200	0.205	150	13,200	44.29
30	2,640	0.354	200	17,600	105.00

STRIKING ENERGY OF AUTOMOBILES (DURAND)

Let W = weight of automobile, measured in pounds.
F = average force over the distance required to bring automobile to rest, measured in pounds.
L = distance over which force is exerted to bring automobile to rest, measured in feet.
V = velocity in feet per second,

Then Energy $= \dfrac{W V^2}{64.4}$ in foot pounds,

$F L$ = measure of destructive work done in stopping the machine.

Then $$F L = \frac{W V^2}{64.4}$$

$$F = \frac{W V^2}{64.4 L}$$

$$L = \frac{W V^2}{64.4 F}$$

Or, otherwise and more generally, let E be any fraction or amount of energy which is lost in overcoming an average resistance F over a distance L.
Then:

$$E = F L$$
$$F = E \div L$$
$$L = E \div F$$

In the actual case of automobile collision, F, as has been carefully noted, is merely a distance average of the force developed. It means simply that there will be as much destructive work done as would correspond to the exhibition of a force F over a distance L. Actually, the destructive work will be made up of parts, each one of which may consist of a very much larger force, acting through such smaller distance as may be needed for the rupture of the part in question.

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ALLOWANCES FOR FITS IN AUTOMOBILE CONSTRUCTION

Fits in automobile construction can be divided into,

Force Fits.

To be used in parts where disassembling will hardly be required, and which are assembled by means of hydraulic or screw presses, or when hot.

Driving Fits.

To be used in parts where close adherence is required, but which must be as em bled and disassembled with no other help than an ordinary hammer; such as fly wheels, gear wheels, ball-bearing inner races, etc.

Push Fits.

To be used in parts without relative motion in actual work but which must have sufficient freedom to be assembled by hand; such as bolts, slip joints, ball bearing outer races, etc.

Running Fits.

To be used in parts possessed of relative motion in normal running; these can be subdivided into,

Easy Fits; where great freedom of running is required with possibility of scant lubrication, such as valve guides, control connections, clutch shafts, etc.

Close Fits; to be used in all high-speed work and especially the engine and transmission.

Fine Fits; to be used in parts where great accuracy is required or where, while the motion is slight the stresses are of an alternating or vibratory nature, such as connecting rod small ends, steering connections etc.; efficient lubrication must be provided if the motion is frequently recurring.

FIT ALLOWANCES

In the allowances given in the following the expansion of metals when of different nature or exposed to heat in a different degree, such as is the case in some parts of engine construction, has not been taken into account.

Allowance Over Nominal Diameter for Force Fits

	½"	1"	2"	3"
Nominal diameter	½"	1"	2"	3"
Maximum "	0.50100	1.00200	2.00400	3.00600
Minimum "	0.50050	1.00150	2.00300	3.00450

Allowance Over Nominal Diameter for Driving Fits

	½"	1"	2"	3"
Nominal diameter	½"	1"	2"	3"
Maximum "	0.50050	1.00100	1.00125	1.00250
Minimum "	0.50025	1.00075	1.00100	1.00150

Allowance Below Nominal Diameter for Push Fits

	½"	1"	2"	3"
Nominal diameter	½"	1"	2"	3"
Maximum "	0.49975	0.99950	1.99900	2.99850
Minimum "	0.49925	0.99900	1.99850	2.99800

Allowance Below Nominal Diameter for Running Fits

EASY FITS

	½"	1"	2"	3"
Nominal diameter	½"	1"	2"	3"
Maximum "	0.49900	0.99875	1.99825	2.99800
Minimum "	0.49800	0.99725	1.99650	2.99575

CLOSE FITS

	½"	1"	2"	3"
Nominal diameter	½"	1"	2"	3"
Maximum "	0.59925	0.99900	1.99875	2.99850
Minimum "	0.59875	0.99800	1.99750	2.99700

FINE FITS

	½"	1"	2"	3"
Nominal diameter	½"	1"	2"	3"
Maximum "	0.59950	0.99925	1.99925	2.99900
Minimum "	0.59925	0.99875	1.99850	2.99800

For intermediate dimensions comparison between the size immediately below and that immediately above will give the safe allowances in each case.

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ENERGY CONSUMPTION OF COMMERCIAL VEHICLES (CHURCH-WARD)

The tractive effort of pneumatic tires on hard level asphalt varies from 15 pounds per ton for special tires designed for electric runabouts up to 35 pounds per ton for the standard type used on gasoline touring cars.

The tractive effort of pneumatic tires is also greatly affected by the air pressure increasing rapidly as the air pressure is reduced.

The tractive effort of solid tires on hard level asphalt varies from 18 pounds to 26 pounds per ton, depending upon:

(1) The diameter of driving wheels.
(2) Revolutions per minute.
(3) Load in pounds, per square inch or pounds per inch width.
(4) Composition of the compound used.
(5) Method of attaching tire to wheel rim.

The tractive effort of a vehicle will vary with the road surface as per table, taking the tractive effort of a vehicle on hard level alphalt as unity.

(1) Level asphalt (hard)	1.00
(2) Wood pavement	1.15
(3) Level macadam	1.15 to 3
(4) Plank road	.9
Cobble stones	1.75
(5) Good dirt road	1.10 to 2
(6) Ordinary country road (dirt)	2.
(7) Sand	20

The tractive effort due to grades must be added to the tractive effort for a given road surface. Example: 5 per cent. grade on hard level asphalt. Hard level asphalt 25 pounds per ton. 5 per cent. grade = 100 pounds per ton, due to grade alone. 100 + 25 = total tractive effort = 125 pounds per ton, total.

Taking everything into consideration, that is to say, life of engine, transmission, tires and maintenance of vehicle as a whole, experience shows that the following table of economic speeds is approximately correct:

Gross Weight	Type of Tires	Speed in M.P.H.
1,500 lbs.	Pneumatic	20
2,000 "	"	20
3,000 "	"	18
4,000 "	"	16
2,000 "	Solid	16
3,000 "	"	15
4,000 "	"	13
5,000 "	"	11
7,000 "	"	9
10,000 "	"	8.
15,000 "	"	7
20,000 "	"	6

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RESULTS OF 1910 FRENCH MILITARY WAGON TRIALS

Official results of the French regularity and fuel tests of military motor vehicles in 1910 issued by the Automobile Club of France are contained in the accompanying table. The tests covered a total distance of 1570 miles. Gasoline, benzol and alcohol were used as fuels at different stages of the test. The results show an average mileage for the different fuels as follows: Gasoline, 9.7 miles to the gallon; benzol, 10.4 miles to the gallon; alcohol, 8.2 miles to the gallon. Weather and road conditions during the trials were favorable.

FUEL CONSUMPTION OF MOTOR WAGONS IN FRENCH MILITARY TRIALS.

	Total Wgt., Lbs.	Useful Load, Lbs.	Lubricating Oil 1570 Miles		Gasoline 560 Miles			Benzol 560 Miles			Carbureted Alcohol 450 Miles		
			Total in Galls.	Miles per Gall.	Avge. Speed m.p.h.	Total Galls.	Miles per Gall.	Avge. Speed m.p.h.	Total Galls.	Miles per Gall.	Avge. Speed m.p.h.	Total Galls.	Miles per Gall.
*Saurer	12,658	5,796	....	368	14.6	....	9.4	....	....	10.8	....	....	8.1
*Delahaye	14,524	7,896	....	194	11.0	....	11.1	....	....	11.15	....	....	10.5
DeDion Bouton	13,299	8,427	6.2	254	9.5	49.5	11.3	9.8	47.9	11.7	9.6	49.0	9.2
DeDion Bouton	13,161	7,444	4.9	320	9.5	54.5	10.3	9.8	50.0	11.4	9.7	49.0	9.2
Peugeot	13,106	7,903	8.8	178	10.4	54.5	10.3	9.5	53.0	10.6	10.4	54.3	8.3
Peugeot	13,346	8,143	8.8	178	10.4	55.1	10.1	9.5	50.8	11.0	10.5	53.0	8.5
Delahaye	13,855	8,593	7.5	209	8.6	63.0	8.9	8.2	65.0	8.6	7.7	62.4	7.2
Delahaye	13,822	8,553	8.8	178	8.6	68.8	8.2	8.2	67.0	8.4	7.8	69.2	6.5
Panhard-Levassor	12,323	7,609	15.0	145	9.6	49.8	11.2	9.5	51.0	10.9	9.8	49.4	9.1
Panhard-Levassor	12,336	7,640	18.5	85	9.7	50.4	11.1	9.5	49.6	11.3	9.8	50.5	8.9
Panhard-Levassor	13,653	8,703	19.8	79	9.8	56.1	10.0	9.8	58.3	9.6	10.2	51.2	8.8
Panhard-Levassor	13,564	8,670	16.3	96	9.7	54.5	10.3	9.9	55.5	10.1	10.2	56.2	8.1
Berliet	11,827	7,465	7.5	209	8.5	62.6	9.0	8.8	59.4	9.5	8.5	63.8	7.1
Berliet	11,838	7,473	7.5	209	8.5	63.5	8.8	8.8	53.6	10.4	8.5	58.2	7.6
Berliet	14,651	9,801	14.3	110	8.3	75.2	7.5	8.5	54.0	10.4	8.3	55.8	8.0
Berliet	14,631	9,781	15.6	100	8.2	76.5	7.3	8.5	56.3	10.0	8.3	70.6	6.4
Vinot-Deguingand	10,987	6,864	5.9	266	9.8	45.5	12.3	9.5	44.4	12.6	9.8	41.8	10.7
Vinot-Deguingand	10,832	6,710	9.7	162	9.8	46.4	12.1	9.7	46.0	12.2	10.3	45.4	9.

*1909 Winner
Useful load includes weight of body.

CO-EFFICIENTS OF FRICTION

The relative value of different materials of construction ascertained as the result on tests made by the National Brake & Clutch Company is tabulated as follows:

Materials	Co-efficient
Metal and cork, Leather and cork, Fibre and cork, on dry metal	0.35
Metal and cork, Leather and cork, Fibre and cork, on oily metal	0.32
Fibre on dry metal	0.27
Fibre on oily metal	0.10
Leather on dry metal	0.23
Leather on oily metal	0.15
Charred leather on oily metal	0.08
Metal on dry metal	0.15
Metal on oily metal	0.07

The co-efficient will vary with the condition of the contacting surfaces. Smooth and unyielding surfaces offer less resistance than rough and yielding ones. In metal to metal contacts different metals are usually employed for the opposing surfaces, as bronze and steel in plate clutches and cast iron and steel in brakes of the shoe type.

Index to Tables and Data appears on Pages 23 to 26.

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PRINCIPAL OVERALL DIMENSIONS OF TYPICAL MODERN CARS

H.P.	Type—Remarks	Wheelbase		Length		Width		Height	
		Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
14–16	Side entrance	8	4	12	6	5	2	5	3
14–16	Side entrance (hood up)	8	4	12	6	5	2	7	5
14–16	Side entrance (hood folded)	8	4	13	6	5	2	5	6
14–16	Single landaulette	9	0	13	0	5	2	7	0
14–16	Limousine	9	0	13	0	5	2	7	0
14–16	City carriage	6	10	10	8	5	5	7	4
16–20	Side entrance	9	0	13	0	5	3	5	5
16–20	Side entrance (hood up)	9	0	13	0	5	3	7	7
16–20	Side entrance (hood folded)	9	0	14	0	5	3	5	8
16–20	Seven-seater side entrance	9	9	13	10	5	3	5	5
16–20	Three-quarter landaulette	9	9	13	10	5	3	7	7
16–20	Limousine	9	9	13	10	5	3	7	7
26–30	Side entrance	9	3	13	4	5	7	5	5
26–30	Side entrance (hood up)	9	3	13	4	5	7	7	7
26–30	Side entrance (hood folded)	9	3	14	4	5	7	5	8
26–30	Three-quarter landaulette	10	0	14	1	5	5	7	8
26–30	Limousine	10	0	14	1	5	7	7	8
40	Side entrance	9	8	13	8	6	0	5	6
40	Side entrance (hood up)	9	8	13	8	6	0	7	8
40	Side entrance (hood folded)	9	8	14	8	6	0	5	9
40	Seven-seater side entrance	10	4	14	4	6	0	5	6
40	Three-quarter landaulette	10	4	14	4	6	0	7	8
40	Limousine	10	4	14	4	6	0	7	8

N.B.—In some cases the lamps mean a further increase in length.

From these figures it is possible to deduce the fact that the average additive quantity which the car projects beyond the centers of the wheels is 4 feet 4½ inches. Taking this at 4 feet 6 inches, it is possible to compute the overall length of any car.

FORMULA FOR RATE OF SPEED (TREGO)

To find the rate of speed of an automobile in miles per hour when the total distance covered and the total running time are known:

Given: Time in minutes and seconds and distance.

Using minutes.

Formula is:

$$\frac{D}{\frac{T}{60}} = MPH$$

Divide the time in minutes and fractions thereof by 60. Then divide the distance by this quotient, disregarding decimal points, and the result will be the average speed in miles per hour for the distance.

Example: 105.5 miles in 113 minutes 30 seconds.

```
60)113.5
   ------
  1.89)105.5(55.8 miles per hour.
       945
       ----
       1100
        945
       ----
       1550
       1512
       ----
```

Using seconds,

Formula is:

$$\frac{36}{T \text{ (Time in seconds)}} = MPH.$$

Divide 36 by the time in seconds, the distance being 1 mile.

Example: 1 mile in 45 seconds—

```
45)36 (80 miles per hour.
   360
```

Index to Tables and Data appears on Pages 23 to 26.

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REVOLUTIONS PER MINUTE OF AUTO ROAD WHEELS AT DIFFERENT RATES OF SPEED

Miles per Hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30	35	40
Feet per Minute	88	176	264	352	440	528	616	704	792	880	968	1,056	1,144	1,232	1,320	1,418	1,496	1,584	1,672	1,760	1,936	2,112	2,288	2,464	2,640	3,080	3,520
WHEEL DIAMETERS 12	28	56	84	112	140	168	196	224	252	280	308	336	364	392	420	448	476	504	532	560	616	672	728	784	840	980	1,120
14	24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	528	576	624	672	720	840	960
16	21	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	462	504	546	588	630	735	840
18	18.6	37.33	56	72.66	93.33	112	130.66	145.33	168	186.66	203.33	224	242.66	161.33	280	298.66	317.33	336	354.66	373.33	410.66	448	485.33	522.66	560	653.33	746.66
20	16.8	32.6	50.4	67.2	84	100.8	117.6	134.4	151.2	168	184.8	201.6	218.4	235.2	252	268.8	285.6	302.4	319.2	336	369.6	403.2	436.8	470.4	504	588	672
22	15.27	30.54	45.81	61.09	76.36	91.63	106.90	122.18	137.45	152.72	168	183.27	198.54	213.81	229.09	244.36	259.63	274.90	290.18	305.45	336	366.54	397.09	427.63	458.18	534.54	611.09
24	14	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	308	336	364	392	420	490	560
26	12.92	21.84	38.76	51.69	63.61	77.53	90.46	103.38	116.30	129.23	142.15	155.07	168	180.92	193.84	206.76	219.69	232.61	245.53	258.46	284.30	310.15	336	361.84	397.69	452.30	516.92
28	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	264	288	312	336	360	420	480
30	11.2	22.4	33.6	44.8	56	67.2	78.4	89.6	100.8	112	123.2	134.4	145.6	156.8	168	179.2	190.4	201.6	212.8	224	246.4	268.8	291.2	313.6	336	392	448
32	10.5	21	31.5	42	52.5	63	73.5	84	94.5	105	115.5	126	136.5	147	157.5	168	178.5	189	199.5	210	231	252	273	294	315	367.5	420
34	9.88	19.70	29.64	39.52	49.41	59.29	69.17	79.05	88.94	98.82	108.70	118.58	128.47	138.35	148.23	158.11	168	177.88	187.76	197.64	217.41	237	256.94	276.70	296.47	345.88	395.29
36	9.33	18.66	28	37.33	46.66	56	65.33	74.66	84	93.33	102.66	112	121.33	130.66	140	149.33	158.66	168	177.33	186.66	205.33	224	242.66	261.33	280	326.66	373.33
38	8.8	17.68	26.52	35.36	44.21	53.05	61.89	70.73	79.57	88.42	97.27	106.10	114.94	123.78	132.63	141.47	150.31	159.15	168	176.84	194.52	212.21	238.89	247.57	265.26	309.21	353.42
40	8.4	16.8	25.2	33.6	42	50.4	58.8	67.2	75.6	84	92.4	100.8	109.2	117.6	126	134.4	142.8	151.2	159.6	168	184.8	201.6	218.4	235.2	252	294	336
42	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	176	192	208	224	240	280	320
44	7.63	15.27	22.10	30.54	38.18	45.81	53.45	61.09	68.72	76.36	84	91.63	99.24	106.10	114.54	122.18	129.81	137.45	145.09	156.72	168	183.27	198.54	213.81	229.09	267.27	305.45

Index to Tables and Data appears on Pages 23 to 26.

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RATE OF SPEED IN MILES PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE FROM ONE TO THREE MINUTES

Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour	Time Over Measured Mile		Rate of Speed in Miles per Hour
Min.	*Sec.*		*Min.*	*Sec.*		*Min.*	*Sec.*	
1	0	60.00	1	27	41.38	1	54	31.58
1	1	59.00	1	28	40.91	1	55	31.30
1	2	58.06	1	29	40.45	1	56	31.03
1	3	57.14	1	30	40.00	1	57	30.77
1	4	56.25	1	31	39.56	1	58	30.50
1	5	55.38	1	32	39.13	1	59	30.25
1	6	54.54	1	33	38.71	2	0	30.00
1	7	53.73	1	34	38.29	2	3	29.26
1	8	52.94	1	35	37.89	2	6	28.57
1	9	52.17	1	36	37.50	2	9	27.90
1	10	51.42	1	37	37.11	2	12	27.27
1	11	50.70	1	38	36.73	2	15	26.66
1	12	50.00	1	39	36.36	2	18	26.08
1	13	49.31	1	40	36.00	2	21	25.53
1	14	48.65	1	41	35.64	2	24	25.00
1	15	48.00	1	42	35.29	2	27	24.49
1	16	47.37	1	43	34.95	2	30	24.00
1	17	46.75	1	44	34.61	2	33	23.53
1	18	46.15	1	45	34.28	2	36	23.07
1	19	45.57	1	46	33.96	2	39	22.64
1	20	45.00	1	47	33.64	2	42	22.22
1	21	44.44	1	48	33.33	2	45	21.81
1	22	43.90	1	49	33.03	2	48	21.42
1	23	43.37	1	50	32.72	2	51	21.05
1	24	42.85	1	51	32.43	2	54	20.69
1	25	42.35	1	52	32.14	3	0	20.00
1	26	41.86	1	53	31.86	..	..	.....

SPEED FORMULA

To reduce *A* miles in *B* seconds to miles per hour,

$$A \times \frac{3600}{B} = \text{miles per hour.}$$

SPEED EQUIVALENTS IN AMERICAN AND FRENCH MEASUREMENTS

1 mile per hour	= 88	ft. per minute.
	= 1.46	ft. per second.
	= 27.8	metres per minute.
	= 0.463	metre per second.
1 km. per hour	= 0.624	miles per hour.
	= 54.9	ft. per minute.
	= 0.914	metre per second.

Index to Tables and Data appears on Pages 23 to 26.

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REFERENCE TABLE SHOWING EQUIVALENT SPEED IN MILES AND KILOMETERS PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE OR MEASURED KILOMETER FROM 24 SECONDS PROGRESSIVELY BY 1-5 SECOND TO 59 4-5 SECONDS

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres. per hour.	Time of one Kilometre m. s.	Equal to Kilometres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilo metres per hour.	Time of one Kilometre m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
24	150.00	241.54	24	150.00	93.15	35	102.85	165.62	35	102.85	63.87
1/5	148.76	239.55	1/5	148.76	92.38	1/5	102.27	164.68	1/5	102.27	63.51
2/5	147.54	237.58	2/5	147.54	91.62	2/5	101.69	163.75	2/5	101.69	63.15
3/5	146.34	235.65	3/5	146.34	90.87	3/5	101.12	162.83	3/5	101.12	62.79
4/5	145.16	233.75	4/5	145.16	90.14	4/5	100.56	161.93	4/5	100.56	62.44
25	144.00	231.88	25	144.00	89.42	36	100.00	161.03	36	100.00	62.10
1/5	142.86	230.05	1/5	142.86	88.71	1/5	99.44	160.13	1/5	99.44	61.75
2/5	141.73	228.23	2/5	141.73	88.01	2/5	98.90	159.26	2/5	98.90	61.41
3/5	140.62	226.44	3/5	140.62	87.32	3/5	98.36	158.39	3/5	98.36	61.08
4/5	139.53	224.67	4/5	139.53	86.64	4/5	97.82	157.52	4/5	97.82	60.74
26	138.46	222.96	26	138.46	85.98	37	97.29	156.67	37	97.29	60.41
1/5	137.40	221.25	1/5	137.40	85.32	1/5	96.77	155.83	1/5	96.77	60.09
2/5	136.36	219.58	2/5	136.36	84.68	2/5	96.25	155.00	2/5	96.25	59.77
3/5	135.34	217.94	3/5	135.34	84.04	3/5	95.74	154.17	3/5	95.74	59.45
4/5	134.33	216.31	4/5	134.33	83.42	4/5	95.23	153.34	4/5	95.23	59.13
27	133.33	214.70	27	133.33	82.80	38	94.73	152.55	38	94.73	58.82
1/5	132.25	213.12	1/5	132.35	82.19	1/5	94.24	151.75	1/5	94.24	58.52
2/5	131.38	211.56	2/5	131.38	81.58	2/5	93.75	150.96	2/5	93.75	58.22
3/5	130.43	210.03	3/5	130.43	80.10	3/5	93.26	150.17	3/5	93.26	57.91
4/5	129.50	208.53	4/5	129.50	80.42	4/5	92.78	149.40	4/5	92.78	57.61
28	128.57	207.03	28	128.57	79.84	39	92.30	148.64	39	92.30	57.32
1/5	127.66	205.57	1/5	127.66	79.27	1/5	91.83	147.87	1/5	91.83	57.02
2/5	126.76	204.12	2/5	126.76	78.71	2/5	91.37	147.13	2/5	91.37	56.74
3/5	125.87	202.69	3/5	125.87	78.16	3/5	90.91	146.39	3/5	90.91	56.45
4/5	125.00	201.29	4/5	125.00	77.62	4/5	90.45	145.65	4/5	90.45	56.17
29	124.13	199.88	29	124.13	77.08	40	90.00	144.92	40	90.00	55.89
1/5	123.28	198.52	1/5	123.28	76.55	1/5	89.55	144.20	1/5	89.55	55.61
2/5	122.45	197.18	2/5	122.45	76.04	2/5	89.11	143.49	2/5	89.11	55.33
3/5	121.62	195.84	3/5	121.62	75.52	3/5	88.67	142.78	3/5	88.67	55.06
4/5	120.80	194.52	4/5	120.80	75.01	4/5	88.23	142.07	4/5	88.23	54.79
30	120.00	193.23	30	120.00	74.52	41	87.80	141.39	41	87.80	54.52
1/5	119.20	191.95	1/5	119.20	74.02	1/5	87.38	140.70	1/5	87.38	54.26
2/5	118.42	190.69	2/5	118.42	73.54	2/5	86.95	140.01	2/5	86.95	53.99
3/5	117.64	189.43	3/5	117.64	73.05	3/5	86.53	139.34	3/5	86.53	53.73
4/5	116.88	188.21	4/5	116.88	72.58	4/5	86.12	138.68	4/5	86.12	53.48
31	116.13	187.00	31	116.13	72.11	42	85.71	138.02	42	85.71	53.22
1/5	115.38	185.79	1/5	115.38	71.65	1/5	85.30	137.35	1/5	85.30	52.97
2/5	114.65	184.62	2/5	114.65	71.20	2/5	84.90	136.71	2/5	84.90	52.72
3/5	113.90	183.41	3/5	113.90	70.73	3/5	84.50	136.07	3/5	84.50	52.47
4/5	113.21	182.28	4/5	113.21	70.30	4/5	84.11	135.44	4/5	84.11	52.23
32	112.50	181.16	32	112.50	69.86	43	83.72	134.81	43	83.72	51.99
1/5	111.80	180.03	1/5	111.80	69.43	1/5	83.33	134.18	1/5	83.33	51.75
2/5	111.11	178.92	2/5	111.11	69.00	2/5	82.95	133.57	2/5	82.95	51.51
3/5	110.43	177.82	3/5	110.43	68.57	3/5	82.57	132.96	3/5	82.57	51.27
4/5	109.75	176.73	4/5	109.75	68.15	4/5	82.19	132.35	4/5	82.19	51.04
33	109.09	175.67	33	109.09	67.74	44	81.81	131.75	44	81.81	50.80
1/5	108.43	174.60	1/5	108.43	67.33	1/5	81.44	131.14	1/5	81.44	50.57
2/5	107.78	173.56	2/5	107.78	66.93	2/5	81.08	130.56	2/5	81.08	50.35
3/5	107.14	172.53	3/5	107.14	66.53	3/5	80.71	129.96	3/5	80.71	50.12
4/5	106.51	171.51	4/5	106.51	66.14	4/5	80.35	129.38	4/5	80.35	49.89
34	105.88	170.50	34	105.88	65.75	45	80.00	128.82	45	80.00	49.68
1/5	105.26	169.50	1/5	105.26	65.36	1/5	79.64	128.24	1/5	79.64	49.45
2/5	104.65	168.52	2/5	104.65	64.98	2/5	79.29	127.68	2/5	79.29	49.24
3/5	104.04	167.53	3/5	104.04	64.61	3/5	78.94	127.11	3/5	78.94	49.02
4/5	103.45	166.58	4/5	103.45	64.24	4/5	78.60	126.57	4/5	78.60	48.81

(Continued on page 614)

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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilo-metres. per hour.	Time of one Kilome-tre m. s.	Equal to Kilo-metres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilo metres per hour.	Time of one Kilome-tre m. s.	Equal to Kilo-metres per hour.	Equal to miles per hour.
46	78.26	126.02	46	78.26	48.60	53	67.92	109.38	53	67.92	42.18
⅕	77.92	125.47	⅕	77.92	48.39	⅕	67.66	108.95	⅕	67.66	42.01
⅖	77.58	124.92	⅖	77.58	48.17	⅖	67.41	108.55	⅖	67.41	41.86
⅗	77.25	124.39	⅗	77.25	47.97	⅗	67.16	108.14	⅗	67.16	41.70
⅘	76.92	123.86	⅘	76.92	47.76	⅘	66.91	107.74	⅘	66.91	41.55
47	76.59	123.34	47	76.59	47.56	54	66.66	107.34	54	66.66	41.39
⅕	76.27	122.81	⅕	76.27	47.36	⅕	66.42	106.95	⅕	66.42	41.24
⅖	75.95	122.30	⅖	75.95	47.16	⅖	66.17	106.55	⅖	66.17	41.09
⅗	75.63	121.78	⅗	75.63	46.96	⅗	65.93	106.16	⅗	65.93	40.94
⅘	75.31	121.27	⅘	75.31	46.76	⅘	65.69	105.78	⅘	65.69	40.79
48	75.00	120.77	48	75.00	46.57	55	65.45	105.40	55	65.45	40.64
⅕	74.68	120.25	⅕	74.68	46.37	⅕	65.21	105.00	⅕	65.21	40.49
⅖	74.38	119.77	⅖	74.38	46.19	⅖	64.98	104.63	⅖	64.98	40.35
⅗	74.07	119.27	⅗	74.07	46.00	⅗	64.74	104.25	⅗	64.74	40.20
⅘	73.77	118.79	⅘	73.77	45.81	⅘	64.51	103.88	⅘	64.51	40.06
49	73.47	118.30	49	73.47	45.62	56	64.28	103.52	56	64.28	39.92
⅕	73.17	117.82	⅕	73.17	45.44	⅕	64.05	103.14	⅕	64.05	39.77
⅖	72.87	117.34	⅖	72.87	45.25	⅖	63.83	102.78	⅖	63.83	39.64
⅗	72.58	116.87	⅗	72.58	45.07	⅗	63.60	102.41	⅗	63.60	39.49
⅘	72.29	116.40	⅘	72.29	44.89	⅘	63.38	102.06	⅘	63.38	39.36
50	72.00	115.94	50	72.00	44.71	57	63.16	101.70	57	63.16	39.22
⅕	71.71	115.47	⅕	71.71	44.53	⅕	62.93	101.33	⅕	62.93	39.08
⅖	71.42	115.00	⅖	71.42	44.35	⅖	62.71	100.98	⅖	62.71	38.94
⅗	71.14	114.55	⅗	71.14	44.18	⅗	62.50	100.64	⅗	62.50	38.81
⅘	70.86	114.10	⅘	70.86	44.00	⅘	62.28	100.29	⅘	62.28	38.67
51	70.58	113.67	51	70.58	43.83	58	62.07	99.95	58	62.07	38.54
⅕	70.31	113.22	⅕	70.31	43.66	⅕	61.85	99.59	⅕	61.85	38.41
⅖	70.04	112.78	⅖	70.04	43.49	⅖	61.64	99.25	⅖	61.64	38.28
⅗	69.76	112.33	⅗	69.76	43.32	⅗	61.43	98.92	⅗	61.43	38.15
⅘	69.49	111.90	⅘	69.49	43.15	⅘	61.22	98.58	⅘	61.22	38.01
52	69.23	111.48	52	69.23	42.99	59	61.01	98.24	59	61.01	37.88
⅕	68.96	111.04	⅕	68.96	42.82	⅕	60.81	97.92	⅕	60.81	37.76
⅖	68.70	110.62	⅖	68.70	42.66	⅖	60.60	97.58	⅖	60.60	37.63
⅗	68.44	110.21	⅗	68.44	42.50	⅗	60.40	97.26	⅗	60.40	37.51
⅘	68.18	109.79	⅘	68.18	42.34	⅘	60.20	96.94	⅘	60.20	37.38

REFERENCE TABLE SHOWING EQUIVALENT SPEED IN MILES AND KILOMETERS PER HOUR FOR ELAPSED TIME OVER THE MEASURED MILE OR MEASURED KILOMETER FROM 1 MINUTE TO 30 MINUTES

Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilo-metres. per hour.	Time of one Kilome-tre m. s.	Equal to Kilo-metres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilo-metres per hour.	Time of one Kilome-tre m. s.	Equal to Kilo-metres per hour.	Equal to mile per hour.
1 0	60.00	96.61	1 0	60.00	37.26	1 17	46.75	75.28	1 17	46.75	29.03
1 1	59.00	95.00	1 1	59.00	36.64	1 18	46.15	74.31	1 18	46.15	28.66
1 2	58.06	93.49	1 2	58.06	36.05	1 19	45.57	73.38	1 19	45.57	28.30
1 3	57.14	92.01	1 3	57.14	35.48	1 20	45.00	72.46	1 20	45.00	27.94
1 4	56.25	90.58	1 4	56.25	34.93	1 21	44.44	71.56	1 21	44.44	27.60
1 5	55.38	89.17	1 5	55.38	34.39	1 22	43.90	70.69	1 22	43.90	27.26
1 6	54.54	87.82	1 6	54.54	33.87	1 23	43.37	69.84	1 23	43.37	26.93
1 7	53.73	86.52	1 7	53.73	33.36	1 24	42.85	69.00	1 24	42.85	26.61
1 8	52.94	85.25	1 8	52.94	32.87	1 25	42.35	68.19	1 25	42.35	26.30
1 9	52.17	84.01	1 9	52.17	32.40	1 26	41.86	67.40	1 26	41.86	26.00
1 10	51.42	82.80	1 10	51.42	31.93	1 27	41.38	66.63	1 27	41.38	25.7
1 11	50.70	81.64	1 11	50.70	31.48	1 28	40.91	65.87	1 28	40.91	25.40
1 12	50.00	80.51	1 12	50.00	31.05	1 29	40.45	65.13	1 29	40.45	25.10
1 13	49.31	79.40	1 13	49.31	30.62	1 30	40.00	64.41	1 30	40.00	24.84
1 14	48.65	78.34	1 14	48.65	30.21	1 31	39.56	63.70	1 31	39.56	24.56
1 15	48.00	77.29	1 15	48.00	29.81	1 32	39.13	63.01	1 32	39.13	24.30
1 16	47.37	76.28	1 16	47.37	29.41	1 33	38.71	62.33	1 33	38.71	24.04

(Continued on page 615.)

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Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres. per hour.	Time of 1 Kilometre m. s.	Equal to Kilometres. per hour.	Equal to miles per hour.	Time for One Mile. m. s.	Equal to miles per hour.	Equal to Kilometres per hour	Time of 1 Kilometre m. s.	Equal to Kilometres per hour.	Equal to miles per hour.
1 34	38.29	61.66	1 34	38.29	23.77	3 6	19.35	31.16	3 6	19.35	12.01
1 35	37.89	61.01	1 35	37.89	23.53	3 12	18.75	30.19	3 12	18.75	11.64
1 36	37.50	60.38	1 36	37.50	23.28	3 18	18.18	29.27	3 18	18.18	11.29
1 37	37.11	59.76	1 37	37.11	23.04	3 24	17.64	28.40	3 24	17.64	10.95
1 38	36.73	59.14	1 38	36.73	22.81	3 30	17.14	27.60	3 30	17.14	10.64
1 39	36.36	58.55	1 39	36.36	22.58	3 36	16.66	26.82	3 36	16.66	10.34
1 40	36.00	57.97	1 40	36.00	22.35	3 42	16.21	26.10	3 42	16.21	10.06
1 41	35.64	57.39	1 41	35.64	22.13	3 48	15.79	25.42	3 48	15.79	9.80
1 42	35.29	56.82	1 42	35.29	21.91	3 54	15.38	24.76	3 54	15.38	9.55
1 43	34.95	56.28	1 43	34.95	21.70	4 0	15.00	24.15	4 0	15.00	9.31
1 44	34.61	55.73	1 44	34.61	21.50	4 6	14.63	23.56	4 6	14.63	9.08
1 45	34.28	55.20	1 45	34.28	21.28	4 12	14.28	22.99	4 12	14.28	8.86
1 46	33.96	54.68	1 46	33.96	21.09	4 18	13.95	22.46	4 18	13.95	8.66
1 47	33.64	54.17	1 47	33.64	20.89	4 24	13.63	21.95	4 24	13.63	8.46
1 48	33.33	53.67	1 48	33.33	20.70	4 30	13.33	21.46	4 30	13.33	8.28
1 49	33.03	53.19	1 49	33.03	20.51	4 36	13.04	21.00	4 36	13.04	8.10
1 50	32.72	52.69	1 50	32.72	20.32	4 42	12.76	20.54	4 42	12.76	7.92
1 51	32.43	52.22	1 51	32.43	20.14	4 48	12.50	20.13	4 48	12.50	7.76
1 52	32.14	51.75	1 52	32.14	19.96	4 54	12.24	19.71	4 54	12.24	7.60
1 53	31.86	51.30	1 53	31.86	19.78	5 0	12.00	19.32	5 0	12.00	7.45
1 54	31.58	50.85	1 54	31.58	19.61	5 12	11.54	18.58	5 12	11.54	7.16
1 55	31.30	50.40	1 55	31.30	19.43	5 24	11.11	17.89	5 24	11.11	6.90
1 56	31.03	49.96	1 56	31.03	19.27	5 36	10.71	17.24	5 36	10.71	6.65
1 57	30.77	49.55	1 57	30.77	19.11	5 48	10.34	16.65	5 48	10.34	6.42
1 58	30.50	49.11	1 58	30.50	18.94	6 0	10.00	16.10	6 0	10.00	6.21
1 59	30.25	48.71	1 59	30.25	18.78	6 15	9.60	15.46	6 15	9.60	5.96
2 0	30.00	48.30	2 0	30.00	18.63	6 30	9.23	14.86	6 30	9.23	5.73
2 3	29.26	47.11	2 3	29.26	18.17	6 45	8.88	14.30	6 45	8.88	5.51
2 6	28.57	46.00	2 6	28.57	17.74	7 0	8.57	13.80	7 0	8.57	5.32
2 9	27.90	44.92	2 9	27.90	17.32	7 15	8.27	13.31	7 15	8.27	5.13
2 12	27.27	43.91	2 12	27.27	16.93	7 30	8.00	12.88	7 30	8.00	4.97
2 15	26.66	42.93	2 15	26.66	16.55	7 45	7.74	12.46	7 45	7.74	4.80
2 18	26.08	42.00	2 18	26.08	16.20	8 0	7.50	12.08	8 0	7.50	4.66
2 21	25.53	41.11	2 21	25.53	15.85	8 30	7.06	11.37	8 30	7.06	4.38
2 24	25.00	40.25	2 24	25.00	15.52	9 0	6.66	10.72	9 0	6.66	4.13
2 27	24.49	39.43	2 27	24.49	15.21	9 30	6.31	10.16	9 30	6.31	3.92
2 30	24.00	38.64	2 30	24.00	14.90	10 0	6.00	9.66	10 0	6.00	3.72
2 33	23.53	37.89	2 33	23.53	14.61	10 30	5.71	9.19	10 30	5.71	3.54
2 36	23.07	37.15	2 36	23.07	14.32	11 0	5.45	8.77	11 0	5.45	3.38
2 39	22.64	36.45	2 39	22.64	14.06	11 30	5.21	8.39	11 30	5.21	3.23
2 42	22.22	35.78	2 42	22.22	13.80	12 0	5.00	8.05	12 0	5.00	3.10
2 45	21.81	35.12	2 45	21.81	13.54	13 0	4.61	7.42	13 0	4.61	2.86
2 48	21.42	34.49	2 48	21.42	13.31	14 0	4.28	6.89	14 0	4.28	2.66
2 51	21.05	33.89	2 51	21.05	13.07	15 0	4.00	6.44	15 0	4.00	2.48
2 54	20.69	33.31	2 54	20.69	12.85	20 0	3.00	4.83	20 0	3.00	1.86
2 57	20.34	32.75	2 57	20.34	12.63	30 0	2.00	3.22	30 0	2.00	1.24
3 0	20.00	32.20	3 0	20.00	12.42						

SPEED IN MILES PER HOUR WITH DIFFERENT GEAR RATIOS AND ROAD WHEEL SIZES AT 1000 R. P. M. OF ENGINE (WITH 3 PER CENT. LOSS ALLOWANCE)

GEARS	4:1	3½:1	3:1	2½:1	2:1	1:1
30-in. Wheel....	21.64	24.73	28.86	34.63	43.29	86.57
32 " "	23.09	26.38	30.78	36.94	46.17	92.34
33 " "	23.81	27.21	31.74	38.09	47.62	95.23
34 " "	24.53	28 03	32.70	39.25	49.06	98.12
36 " "	25.98	29 68	34.63	41.55	51.94	103.89
38 " "	27.41	31.33	36.55	43.86	54.83	109.66
40 " "	28.85	32.97	38.37	46.16	57.71	115.41

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HILL-CLIMBING FORMULAS (WORBY BEAUMONT)

W = Weight of car and load in pounds.
w = Weight of car and load in tons.
H = Total ascent in feet.
L = Length of hill in feet.
R = Road resistance in pounds per ton weight of car and load.
r = Air resistance in pounds = $V^2 A\ 0.0017$.
V = Velocity of car in feet per second.
A = Area of car in square feet presented to air resistance.
T = Time occupied in ascent in seconds.
E = Efficiency of transmission of power from engine to road wheels.
$HP.$ = Effective horse power of engine.
p = Power given off at road wheels or work done in ascending hill.
S = Speed of ascent in miles per hour.

Then if P = Mean effective cylinder pressure.
L = Length of stroke in feet.
A = Area of piston in square inches.
N = Number of useful or firing strokes per minute,

the brake horse-power of petrol or steam engines, having a mechanical efficiency of E, is

$$\frac{EPLAN}{33000}$$

For compound steam engines the number of useful working strokes are those occurring in the low-pressure cylinder, and the mean effective pressure in the high-pressure cylinder or cylinders is referred to the area of the low-pressure cylinder.

The power given off at the road wheels during the ascent of the hill is

$$p = \frac{HW + (Rw + r)L}{T\ 550}$$

and the brake horsepower required at the engine with a selected value or E is

$$HP = \frac{HW + (Rw + r)L}{TE\ 550}$$

With the other conditions known, the efficiency may be found from

$$E = \frac{HW + (Rw + r)L}{HP.\ T\ 550}$$

the speed of the aseent in miles per hour from

$$S = \frac{\dfrac{L}{HWL + (Rw + r)}}{HP.\ E\ 550} L \times 1.466$$

and the time occupied in the ascent from

$$T = \frac{HW + (Rw + r)L}{HP.\ E\ 550}$$

Unless the probable speed of the car is high, or the wind velocity such that the pressure upon the surface of the car presented to air resistance opposing motion approaches that due to the speed of the car through still air, then the quantity r may be omitted from the foregoing expressions without introducing more than slight error.

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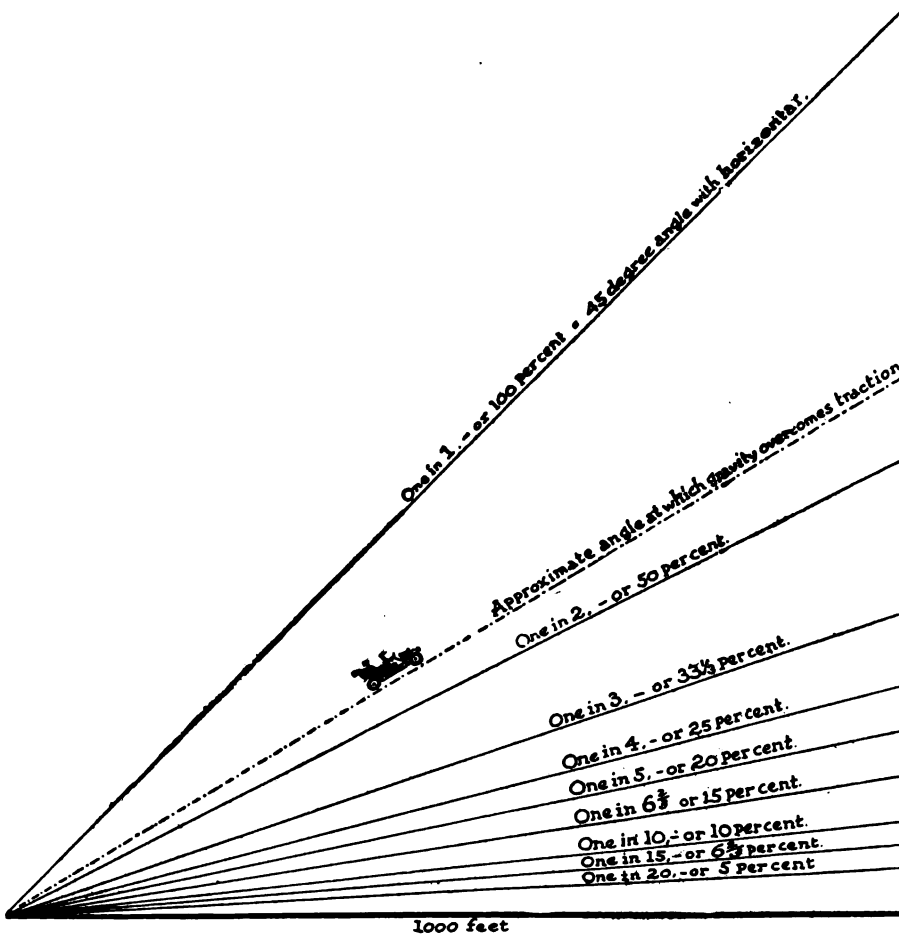
MEASUREMENT OF GRADES



ILLUSTRATING METHOD OF CALCULATING GRADE PERCENTAGES

If it be assumed that the base of the triangle represents a line 1,000 feet long and that the first sloping line represents a road having a rise that brings it 50 feet above the starting point, this is figured as 50 feet in a thousand, or 5 per cent. In other words, one foot of rise for every 20 feet, but the latter distance does not mean distance actually traveled by a car in ascending such a slope, but distance measured horizontally with reference to that slope. The grade is measured by the tangent of the angle of inclination and not by its sine, so that a grade which represents 100 per cent. corresponds to an angle of inclination of but 45 degrees, and not 90 degrees, or perpendicular, as is commonly supposed. At the upper end of the next sloping line the elevation would amount to 66 2/3 feet, which is equivalent to a rise of 6 2/3 feet for each 100 feet traveled horizontally. So one in three corresponds to a 33 1/3 per cent. grade, one in two to a 50 per cent. grade, and so on until a 100 per cent. grade is reached, which, as noted, is the equivalent of a 45 degree angle.

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TABLE OF GRADIENTS

GRADE		Equal to Angle of	Rise or Fall in One Mile, Feet
Per Cent	Units		
20	1 in 5	11° 19′	1056
17	1 " 6	9° 26′	880
14	1 " 7	8° 09′	754
12.5	1 " 8	7° 08′	635
11	1 " 9	6° 17′	586
10	1 " 10	5° 43′	528
9	1 " 11	5° 11′	480
8	1 " 12	4° 46′	440
7.75	1 " 13	4° 24′	406
7	1 " 14	4° 05′	337
6.5	1 " 15	3° 49′	352
6.25	1 " 16	3° 35′	330
6	1 " 17	3° 22′	310
5.5	1 " 18	3° 11′	293
5	1 " 19	3° 00′	277
5	1 " 20	2° 52′	204
4	1 " 25	2° 18′	218
3.3	1 " 30	1° 55′	155
2.8	1 " 35	1° 38′	151
2.5	1 " 40	1° 26′	132

COMPOUND EQUIVALENTS

Atmosphere (14.7 lbs. per square inch) = 1.0335 kilogrammes per square centimetre.
1 Foot-pound = 0.1382 kilogrammetre.
1 lb. per square inch = 0.0703077 kilogramme per square centimetre = 0.7031 gramme per square millimetre = 5.170 centimetres of mercury at 0 degrees Centigrade.
1 Kilogramme per square millimetre = 1422.32 lbs. per square inch = 0.635 ton per square inch.
1 Kilogramme per square centimetre = 14.2232 lbs. per square inch.
1 Gramme per square millimetre = 1.422 lbs. per square inch.
1 Kilogrammetre = 7.233 foot-pounds.
1 Gramme per square centimetre = 0.01422 lb. per square inch.
1 Calorie or French unit of heat = 3.968 British Thermal Units.
French mechanical equivalent of heat (425 kilogrammetres) = 3,074 foot-pounds per unit.
1 Calorie per square metre = 0.369 heat-unit per square foot.
1 Calorie per kilogramme = 1.800 heat-units per lb.
English unit of heat, or heat-unit = 0.252 calorie.
English mechanical equivalent to one heat-unit (778 foot-pounds) = 10.67 kilogrammetres
1 English heat-unit per square foot = 2.713 calories per square metre.
1 English heat-unit per lb. = 5.9 calorie per kilogramme.

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STORAGE BATTERY CHARGING AND DISCHARGING

The positive plate of a lead-storage battery during charge absorbs oxygen gas turning a brown color (Peroxide of Lead, PbO_2) during the process, while the negative is reduced by the hydrogen, changing to a dull gray or slate color—spongy lead.

During discharge the positive plate parts with some of its oxygen and being gradually educed to a lower oxide of lead is attacked by the sulphric acid, forming lead sulphate, $PbSO_4$, while the negative plate gives up some of its hydrogen and is also gradually attacked by the acid, forming lead sulphate too. Meanwhile the density of the electrolyte has become less, owing to the formation of water from the H_2O set free from the plates.

This formation of a film of sulphate on both plates brings them both to a state of balance, and the electromotive force of the battery will fall in proportion to the amount of sulphate abstracted from the acid until only water is left. In practice, the voltage should not be allowed to drop below 1.7 volts, for the reason that the excessive sulphate is almost impossible to remove entirely, and as it is to a considerable extent an insulator it causes a lowering of the voltage of the cell. When discharged the plates will be found to have changed their color somewhat again, both becoming of a lighter shade.

On charging again, both plates give up their sulphate, which returns to the acid, increasing its density to its normal condition as before—the positive plate becoming lead peroxide and the negative, spongy lead, until the cell is fully charged. The sequence of operations might aptly be termed the battery cycle.

This may be better represented in the form of an equation, thus:

BATTERY FULLY CHARGED

Positive Plates	Electrolyte	Negative Plates
PbO_2	H_2SO_4 Sp.Gr. 1.275 (Strong)	Pb

HALF DISCHARGED

$PbO_2 + PbSO_4$	H_2SO_4 Sp. Gr. 1.240 (Medium)	$Pb + PbSO_4$

FULLY DISCHARGED

$PbSO_4$	H_2SO_4 Sp. Gr. 1.180 (Weak)	$PbSO_4$

Where PbO_2 represents the chemical symbol for lead peroxide or dioxide.
Where $PbSO_4$ represents the chemical symbol for lead sulphate.
Where H_2SO_4 represents the chemical symbol for sulphuric acid.

REVERSIBLE CHEMICAL EQUATIONS SHOWING CHANGES WHICH TAKE PLACE IN THE LEAD STORAGE BATTERY (LAMAR LYNDON)

CHARGE

$\longleftarrow$

(a) $PbO_2 + H_2SO_4 = PbSO_4 + H_2O + O$
(b) $Pb + H_2SO_4 = PbSO_4 + H_2$

(c) $c = (a) + (b) = PbO_2 + Pb + {}_2H_2SO_4 = {}_2PbSO_4 + {}_2H_2O$ (2)

$\longrightarrow$

DISCHARGE

Equation (*a*) expresses the reactions at the positive plate; (*b*) those at the negative d (*c*) the combined effect is the fundamental equation of the lead storage battery.

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USEFUL ENGINEERING DATA

Water weighs 62.4 pounds per cubic foot, and 8.3 pounds per gallon.

There are 7.5 gallons in a cubic foot of water.

Gasoline has a specific gravity of .72, and consequently weighs 5.96 pounds per gallon. This applies to 76° gasoline.

A foot-pound represents the work required to raise a weight of one pound to a height of one foot. There are 33,000 foot-pounds to a horsepower.

A British Thermal Unit represents the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near 39° F. Its symbol is B. T. U.

There are 778 foot-pounds in a B. T. U.

There are 42.4 B. T. U. to a horsepower.

The thermal efficiency of a good internal combustion motor is from 30 to 35 per cent.

The mechanical efficiency of a good internal combustion motor should be between 85 and 90 per cent.

On direct drive, with an efficient transmission and differential, about 88 per cent. of the power furnished by the motor should be delivered at the rear wheels.

Under the best conditions, about 75 per cent. of the indicated horsepower of the engine should be available for useful work.

If the work performed at the rear wheels is reduced to heat units, it will be found that about 23 per cent. of the energy represented by the heating value of the fuel is available as useful work.

The piston speed of a motor should not exceed 1,000 feet per minute.

The peripheral velocity of a cast iron flywheel should not exceed 5,000 feet per minute. Should it exceed this speed, there would be danger of the flywheel bursting from centrifugal force.

USEFUL FUNCTIONS OF π

$\pi = 3.14159265$	$\frac{\pi}{7} = 0.44879895$	$\pi^2 = 9.86960440$	$\sqrt{\pi} = 1.77245385$
$\frac{\pi}{2} = 1.57079633$	$\frac{\pi}{16} = 0.19634954$	$\pi^3 = 31.00627668$	$\sqrt{\pi} = 1.46459189$
$\frac{\pi}{3} = 1.04719755$	$\frac{\pi}{24} = 0.13089969$	$\frac{1}{\pi} = 0.31830989$	$\frac{1}{\sqrt{\pi}} = 0.56418958$
$\frac{\pi}{4} = 0.78539816$	$\frac{\pi}{32} = 0.09817477$	$\frac{1}{\pi^2} = 0.10132118$	$\frac{1}{\sqrt[3]{\pi}} = 0.68278406$
$\frac{\pi}{6} = 0.52359878$	$\frac{\pi}{180} = 0.01754329$	$\frac{1}{\pi^3} = 0.03225153$	$\text{Log } \pi = 0.49714987$

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HEAT LOSSES DUE TO INCOMPLETE COMBUSTION IN GASOLINE MOTORS

Assuming that it were possible to secure complete combustion of the fuel, the result would be,

Carbon dioxide (CO_2) and water (H_2O).

With incomplete combustion the carbon is usually burned to carbon monoxide (CO) only, with consequent serious heat loss as the following table shows:

PRODUCTS OF COMBUSTION, FULL AND PARTIALLY LOADED

	Full Load	Partial Load	Slow Free
Carbon monoxide	3.13	6.9	——
Hydrogen	1.19	2.4	——
Hydrocarbons	0.30	0.9	——
Carbon dioxide	11.90	9.9	6.3
Oxygen	.23	0.3	11.2
Nitrogen	83.33	79.6	82.5
Total	100.0	100.0	100.0

Fuel value of carbon burned to carbon monoxide ..... =4,400 B.T.U.
Fuel value of carbon burned to carbon dioxide ..... =14,500 B.T.U.
Fuel value of hydrogen gas to water ..... =62,032 B.T.U.
Fuel value of hydrocarbon fuels to carbon dioxide ..... =20,000 B.T.U.

If we assume that the total as above given is 100 pounds and taking the fuel values as above set down for the respective elements and compounds, it will be possible to show that the loss will be enormous if the combustion is incomplete, as, for illustration, 6.9 pounds of carbon monoxide (shown at the top of the column for partial load) would mean a loss of 62,790 British thermal units of heat (B.T.U.). What is more to the point, the 2.4 pounds of hydrogen would mean a loss of 148,877 B.T.U. In the same way, all the losses may be determined.

COMBUSTION CONSTANTS OF VARIOUS GASES AND FUELS

	Atomic Weight Hydrogen=1	Molecular Weight H_2 = 2	Specific Gravity at 32° F. and Atmospheric Pressure Water=1	Density in Pounds per Cubic Foot	Specific Heat at Constant Pressure	Specific Heat at Constant Volume	Coefficient of Expansion of Volume at Constant Pressure per Deg. Centigrade	Coefficient of Expansion of Volume at Constant Pressure per Deg. Fahrenheit	British Thermal Units Given Out During Combustion with Oxygen
Air	.....	.....	.00130	.0809	.2377	.1690	.003665	.002036	.....
Carbon	11.97	.....	2.33	.....	.2411	.....	.....	.....	14,540
Carbonic acid gas	.....	CO^2 43.89	.00198	.1225	.2164	.1535	.003688	.002049	.....
Carbonic oxide	.....	CO 27.93	.00126	.0784	.2479	.1758	.003667	.002037	4,370
Coal gas (average)	.....	.....	.00054	.0335	.....	.....	.....	.....	17,800
Hydrogen	1	H_2 – 2	.00009	.0056	3.4046	2.414	.003667	.002037	61,260
Methane	.....	CH_4 15.97	.00072	.0448	.5929	.4701	.....	.....	26,400
Oxygen	15.96	O_2 31.92	.00144	.0896	.2182	.156	.....	.....	.....
Steam at 212° F.	.....	H_2O 17.96	.0008	.05	.4750	.34	.....	.....	.....
Refined petroleum	.....	.....	.8	.....	.....	.....	.....	.....	22,000
Crude petroleum	.....	.....	.9	.....	.....	.....	.....	.....	20,000

Specific heat of gas engine exhaust gases = .258 at constant pressure and .189 at constant volume.

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COST OF FUEL PER BRAKE TEST HORSE POWER

Kind of Motive Power.	Rate of Fuel Consumed.	For 1 Hour					For 24 Hours					For 300 Days of 10 Hours					For 300 Days of 24 Hours				
Gas Engine on Producer Gas.	In lbs. per h.p. per hour.	Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at				
		$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00
	.8	$c.12	$c.16	$c.20	$c.24	$c.28	c 2.9	c 3.9	c 4.8	c 5.76	c 6.72	$3.60	$4.80	$6.00	$7.21	$8.40	$8.64	$11.52	$14.40	$17.29	$20.16
	1.00	.15	.20	.25	.30	.35	3.6	4.8	6.0	7.20	8.40	4.50	6.00	7.50	9.00	10.50	10.80	14.40	18.00	21.61	25.20
	1.25	.19	.25	.31	.38	.44	4.5	6.0	7.5	9.00	10.50	5.63	7.50	9.37	11.24	13.12	13.50	18.00	22.50	27.00	31.50
	1.50	.23	.30	.38	.45	.53	5.4	7.2	9.0	10.80	12.60	6.75	9.00	11.25	13.50	15.75	16.20	21.60	27.00	32.41	37.80
Gas Engine on Natural Gas.	In cu.ft. per h.p. per hour.	Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at					Natural Gas per 1,000 cu.ft. at				
		15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.	15c.	20c.	25c.	30c.	35c.
	9	c .14	c .18	c .23	c .27	c .32	c 3.2	c 4.3	c 5.4	c 6.5	c 7.6	$4.05	$5.40	$6.75	$8.10	$9.45	$9.72	$12.96	$15.20	$19.44	$23.68
	10	.15	.20	.25	.30	.35	3.6	4.8	6.0	7.2	8.4	4.50	6.00	7.50	9.00	10.50	10.80	14.40	18.00	21.60	25.20
	11	.17	.22	.28	.33	.39	4.0	5.3	6.6	7.9	9.2	4.95	6.60	8.25	9.90	11.55	11.88	15.84	19.80	23.76	27.72
	12	.18	.24	.30	.36	.42	4.3	5.8	7.2	8.6	10.0	5.40	7.20	9.00	10.80	12.60	12.96	17.28	21.60	25.92	30.24
Gas Engine on Artificial (Illuminating) Gas.	In cu.ft. per h.p. per hour.	Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at					Artificial Gas per 1,000 cu.ft. at				
		60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00	60c.	70c.	80c.	90c.	$1.00
	15	c .90	c 1.05	c 1.20	c 1.35	c 1.50	c 21.6	c 25.2	c 28.8	c 32.4	c 36.0	$27.00	$31.50	$36.00	$40.50	$45.00	$64.80	$75.60	$86.40	$97.20	$108.00
	17	1.02	1.39	1.36	1.53	1.70	24.5	28.6	32.6	36.7	40.8	30.60	35.70	40.80	45.90	51.00	73.50	85.68	97.80	110.10	122.40
	20	1.20	1.40	1.60	1.80	2.00	28.8	32.8	38.4	43.2	48.0	36.00	42.00	48.00	54.00	60.00	86.40	98.00	115.20	129.60	140.00
Gasoline Engine.	In pints per h.p. per hour.	Gasoline per Gallon at					Gasoline per Gallon at					Gasoline per Gallon at					Gasoline per Gallon at				
		10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.	10c.	12c.	14c.	16c.	18c.
	.80	c 1.00	c 1.20	c 1.40	c 1.60	c 1.80	c 24.0	c 28.8	c 33.6	c 38.4	c 43.2	$30.00	$36.00	$42.00	$48.00	$54.00	$72.00	$80.40	$97.80	$115.20	$129.60
	1.00	1.25	1.50	1.75	2.00	2.25	30.0	36.0	42.0	48.0	54.0	37.50	45.00	52.50	60.00	67.50	90.00	108.00	126.00	144.00	162.00
	1.10	1.37	1.65	1.92	2.20	2.47	33.0	39.6	46.2	52.8	59.4	41.25	49.50	57.75	66.00	74.25	99.00	118.80	138.60	158.40	178.20
Electric Motor (85% efficiency of wiring) 746 w=h.p.	In K. W. per h.p. per hour.	Electricity per K.W. hour at					Electricity per K.W. hour at					Electricity per K.W. hour at					Electricity per K.W. hour at				
		2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.	2c.	3c.	4c.	5c.	7c.
	.878	c 1.75	c 2.63	c 3.51	c 4.39	c 6.14	c 42	c 63	c 84	$1.06	$1.48	$52.68	$79.02	105.36	131.70	184.38	126.60	189.90	253.20	316.50	443.10
Steam Engine on Coal.	In lbs. per h.p. per hour.	Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb. Ton at					Coal per 2,000-lb Ton at				
		$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00	$3.00	$4.00	$5.00	$6.00	$7.00
	4	c .60	c .80	c 1.00	c 1.20	c 1.40	c 14.4	c 19.2	c 24.0	c 28.8	c 33.6	$18.00	$24.00	$30.00	$36.00	$42.00	$43.20	$57.60	$72.00	$86.40	$100.80
	6	.90	1.20	1.50	1.80	2.10	21.6	28.8	36.0	43.2	50.4	27.00	36.00	45.00	54.00	63.00	64.80	86.40	108.00	129.60	151.20
	8	1.20	1.60	2.00	2.40	2.80	28.8	38.4	48.0	57.6	67.2	36.00	48.00	60.00	72.00	84.00	86.40	115.20	144.00	172.80	201.60
	10	1.50	2.00	2.50	3.00	3.50	36.0	48.0	60.0	72.0	84.0	45.00	60.00	75.00	90.00	105.00	108.00	144.00	180.00	216.00	252.00

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PROPORTIONS OF ATMOSPHERIC AIR

(1) To find the quantity of nitrogen by volume corresponding to one volume of oxygen, multiply by 3.77092.

(2) To find the quantity of oxygen by volume corresponding to one volume of nitrogen, multiply by 0.265182.

(3) To find the quantity of nitrogen by weight corresponding to one part by weight of oxygen, multiply by 3.313022.

(4) To find the quantity of oxygen by weight corresponding to one part by weight of nitrogen, multiply by 0.301839.

(5) To find the quantity of nitrogen by volume corresponding to one part by weight of oxygen, multiply by 2.6365411.

(6) To find the quantity of oxygen by volume corresponding to one part by weight of nitrogen, multiply by 0.2730071.

(7) To find the quantity of nitrogen by weight corresponding to one part by volume of oxygen, multiply by 3.6629154.

(8) To find the quantity of oxygen by weight corresponding to one part by volume of nitrogen, multiply by 0.3792848.

Formula for correcting the volume of gases for temperature and pressure:

$$\frac{V}{V^1} = \frac{(273+t)P^1}{273+t^1P}.$$

When,

V = original volume;
V^1 = corrected volume;
t = original temperature in degrees Centigrade;
t^1 = final temperature in degrees Centigrade;
P = original pressure;
P^1 = final pressure;
273 = absolute temperature in degrees Centigrade.

Absolute temperature, if measured in Fahrenheit units, instead of in Centigrade as above given, would be 491.13 below the melting point of ice. The volume of a perfect gas increases 1/273 of its volume at 0 degrees Centigrade for every increase of 1 degree on the same scale. According to this, absolute zero corresponds to the temperature at which the same perfect gas would reduce to nothing.

RELATION OF GASOLINE VAPOR TO AIR

In any discussion of the relation of gasoline to atmospheric air, it becomes necessary to carefully distinguish as between vaporized and liquid gasoline. With air at 60 degrees Fahrenheit, about 15 per cent. of true gasoline vapor will produce a state of saturation. Such a mixture would be non-explosive, and in practice the following holds:

Volumes of Gasoline Vapor in Per Cent. of Air Volumes	*Volumes of Atmospheric Air at 60° F. Corresponding	
15.0	.....	Saturation point of air at 60° F.
5.5	3,400	Too rich to serve for the purpose
4.0	4,000	Uncertain in its action.
....	5,000	.....
....	6,000	.....
....	7,000	.....
2.4	8,000	Suitable for the best results.
....	9,000	.....
1.9	10,000	Too uncertain to be of value.

* In the above table the volumes of air relate to one volume of liquid gasoline, whereas the vapor volumes are in percentage of the air volumes used in each case. Absolutely accurate determinations will depend upon the mixture being of a definite character.

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PROPERTIES OF GASOLINE AND DENATURED ALCOHOL (MUNTZ)

Properties	Gasoline	Denatured Alcohol
Carbon	84.3 per cent.	41.5 per cent.
Hydrogen	15.7 per cent.	13.0 per cent.
Oxygen	.....	45.5 per cent.
Density at 15° C	.708	.834
Boiling point	88° C.	78.5° C.
Calories per Kg	*11,359.65	‡6,521.75
Weight evaporated per hour per dm.² (15.5 sq. in.) of surface:		
1. In experiment room; 18° C	9.37 g. (0.33 oz.)	3.47 g. (0.12 oz.)
2. Outside in the sun; 25° C	47.21 g. (1.66 oz.)	27.08 g. (0.95 oz.)

* 20,488 British heat units per lb. ‡ 11,762 British heat units per lb.

TESTS WITH BRITISH MOTOR FUEL

GASOLINE AND BENZOL TESTS

Six-Cylinder Napier Engine

	Specific Gravity	Temperature of Testing Room Fahr.	Average of Three Tests, B.H.P.	Remarks
Ordinary gasoline	.687	67.1	64.25	
" "	.699	69.8	64.4	
" "	.713	65.3	64.4	
" "	.714	60.8	65.5	
" "	.759	67.1	63.5	
Benzol	.873	75.2	64.1	Exhaust has a sulphurous, pungent smell. Engine started quite easily.

PROPERTIES OF GASES

(1*)	(2*)	(3*)	(4*)	(5*)
Hydrogen	H	.0692	.00559	52230
Oxygen	O	1.106	.08921	.....
Nitrogen	N	.971	.07831	.....
Carbon Monoxide	CO	.967	.07807	4380
Carbon Dioxide	CO_2	1.529	.12267	.....
Dry Air	.....	1.000	.08072	.....
Water Vapor	H_2O	.625	.05020	.....
Acetylene	C_2H_2	.915	.07251	20673
Methane	CH_4	.554	.04464	21385
Ethylene	C_2H_2	.974	.07805	20025
Alcohol	C_2H_6O	1.601	.12598	12000

*1 Gases.
*2 Chemical Formula or Symbol.
*3 Density (Air = 1).
*4 Weight per cubic foot under standard conditions.
*5 Heating values per pound in B. T. U.

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SPECIFIC HEAT OF HYDROCARBONS

In order to be able to estimate the losses in the exhaust of a motor it is necessary to know the specific heat of the elements and compounds determined by analysis of the exhaust, together with the range of temperatures, as well as the weight of the exhaust gases. The specific heat values are as follows:

Elements and Compounds	Specific Heat
Carbon	0.241
Carbon monoxide	0.2479
Oxygen	0.218
Hydrogen	0.244
Nitrogen (approximately)	0.240

Since over 80 per cent. of the whole weight of gas (mixture) will be nitrogen, it follows that much of the heat lost to the exhaust is taken away in the nitrogen. This fact, coupled with the absence of heat value, in nitrogen, tends to the contention that nitrogen is an evil without a recompense. In the absence of nitrogen, however, the fuel would be so quick-burning that the pistons would not be capable of receding rapidly enough to enable the functions to be performed, and it follows that some element has to be present, the nature of which will serve to dampen the rate of flame propagation. Nitrogen is at hand in the right proportion and the cost of its provision is therefore nil, since, as exemplified above, it has no heat value.

PROPERTIES OF SOME OF THE CONSTITUENTS OF GASOLINE

Name	Per Cent. of Carbon	Per Cent. of Hydrogen	Boiling Point—Fahr.	Specific Gravity	Vapor Density
Pentane	83.20	16.71	87	.640	2.538
Hexane	83.68	16.32	143	.676	3.053
Heptane	83.90	16.04	165	.718	3.547

PROPORTIONS OF HYDROGEN AND CARBON IN FUELS

Commercial Names of Fuels	Hydrogen by Weight	Carbon by Weight
Gasoline	16	84
Benzine	8	92
Kerosene	15	85
Tar benzol	8	92
*Grain Alcohol	8	32

*Alcohol, in addition to carbon and hydrogen, holds 50 per cent. of oxygen.

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CAPACITY OF ATMOSPHERIC AIR FOR VAPOR AT DIFFERENT TEMPERATURES

Temperature in Degrees Fahrenheit	Pounds per Cubic Feet Dry Air	Pounds of Vapor in One Pound of Air	Weight in Pounds, Cubic Feet Saturated Air	Vapor in Air	A | V
32	0.0807	0.00379	0.0802	0.000304	263.7
42	0.0791	0.00561	0.0784	0.000440	178.18
52	0.0776	0.00819	0.0766	0.000627	122.
62	0.0761	0.01179	0.0747	0.000881	85.
72	0.0747	0.01680	0.0727	0.001221	59.5
82	0.0733	0.02361	0.0706	0.001667	42 3
92	0.0720	0.03289	0.0684	0 002250	30.3
102	0.0707	0.04547	0.0659	0.002997	22.

VISCOSITY OF GASOLINE

In considering the functioning of the gasoline carbureter, changes in viscosity of the fuel due to differences in temperature should be considered. It is a mistake to assume that because gasoline does not noticeably thicken up at the lower atmospheric temperatures (usual in the Northern States in winter) it will flow through the nozzle of a carbureter at the same rate under all heat conditions. Taking gasoline of a specific gravity of 0.71, it has been shown by experiment that the amount which will pass through a nozzle of a carbureter under a given pressure will increase as the temperature is increased in the following manner:

Temperature in ° F.	50	59	68	77	86	95
Relative flow	1	1.073	1.145	1.212	1.27	1.335

Since nozzles in carbureters are not readily adjustable, and with any degree of certainty, it follows that such a great difference in the weight of fuel ejected, considering the differences in temperature named, is bound to lead to a certain amount of carbureter inefficiency of the kind which does not readily yield to treatment.

The following table gives the density and viscosity (expressed in C. G. S. units) of gasoline at different temperatures centigrade.

Density at 15 Degrees Centigrade	Viscosity at 5 Degrees Centigrade	Viscosity at 15 Degrees Centigrade	Viscosity at 25 Degrees Centigrade
0.680*	0.00376	0.00342	0.00319
0.684	0.00380	0.00352	0.00332
0.704	0.00406	0.00380	0.00359
0.707	0.00445	0.00420	0.00398
0.714	0.00431	0.00404	0.00385
0.719	0.00445	0.00420	0.00398
0.720	0.00450	0.00421	0.00400
0.721	0.00454	0.00421	0.00400
0.725	0.00486	0.00454	0.00430

*Hexane.

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CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES OF VARIOUS SUBSTANCES THAT HAVE A HEAT VALUE

Fuel	Chemical Proportions	Weight of Gas at 30°, per Cubic Foot	Volume of 1 Pound of Gas at Atmospheric Pressure, Cubic Feet		Volume Required to Burn 1 Cubic Foot of Gas, Cubic Feet		Weight Required to Burn 1 Pound of Gas, Pounds		Specific Heat of Gas at Constant Pressure	Heat of Combustion	
		Pound	32°	62°	O	Air	O	Air		B.T.U. per Pound of Fuel	B.T.U. per Cubic Foot of Gas at 62°
Oxygen, O	23 lb. O + 77 lb. N = 100 lb. air	.08927	11.20	11.88	...	.....	....	.....	.21751	.....	.....
Nitrogen, N	21 vol. O + 79 vol. N = 100 vol. air	.07847	12.77	13.55	...	.....	....	.....	.24380	.....	.....
Hyrdogen, H	$2H + O = H_2O$	.00562	178.80	189.80	.5	2.38	8.00	34.80	3.40900	62,000	327
Carbon, C	$C + O = CO$	.....	.....	.....	...	.....	....	.....	.....	4,400	.....
Carbon, C	$C + 2O = CO_2$	.....	.....	.....	...	.....	....	.....	.....	14,600	.....
Carbon monoxide, CO	$CO + O = CO_2$	.07704	12.77	13.55	.5	2.38	.57	2.48	.24790	.....	324
Carbon dioxide, CO_2	1 lb. C + 2.66 lb. O = 3.66 lb. CO_2	.12323	8.12	8.60	...	.....	....	.....	.21700	4,385	.....
Methane (marsh gas), CH_4	$CH_4 + 4O = 2H_2O + CO_2$	.04538	22.37	23.73	2.0	9.52	4.00	17.40	.59290	23,976	1,010
Ethylene (olefiant gas), C_2H_4	$C_2H_4 + 6O = 2H_2O + 2CO_2$	.07830	12.77	13.55	3.0	14.28	3.43	14.90	.40400	21,476	1,585
Ethane, C_2H_6	$C_2H_6 + 7O = 3H_2O + 2CO_2$	.08369	11.94	12.67	3.5	16.66	....	.....	.....	22,356	1,765
Benzol vapors, C_6H_6	$C_6H_6 + 15O = 3H_2O + 6CO_2$	.22363	4.47	4.74	7.5	35.7	....	.....	.37540	18,183	3,836
Acetylene, C_2H_2	$C_2H_2 + 5O = H_2O + 2CO_2$	.07251	13.79	14.63	2.5	11.9	....	.....	.....	21,421	1,464

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MOLECULAR WEIGHT OF PETROLEUM DISTILLATES

The atomic weight of the elements entering into the fractions may be set down thus:

Hydrogen	1
Carbon	12
Oxygen	16

The molecular weight may be found as follows:

(*a*) butane, $C_4H_{10} = 4 \times 12 + 10 \times 1 = 58$;
(*b*) pentane, $C_5H_{12} = 5 \times 12 + 12 \times 1 = 72$;
(*c*) hexane, $C_6H_{14} = 6 \times 12 + 14 \times 1 = 86$;
(*d*) heptane, $C_7H_{16} = 7 \times 12 + 16 \times 1 = 100$;
(*e*) octane, $C_8H_{18} = 8 \times 12 + 18 \times 1 = 114$;
(*f*) nonane, $C_9H_{20} = 9 \times 12 + 20 \times 1 = 128$;
(*g*) decane, $C_{10}H_{22} = 10 \times 12 + 22 \times 1 = 142$.

In like manner the molecular weight of any of the compounds may be found, the rule for which may be stated as follows:

Multiply the atomic weight of each element by the number of atoms for each element and the sum of the respective products will be the molecular weight of the resultant compound.

In general practice it has been the custom to consider that gasoline was largely hexane, the molecular weight of which was taken in the further determinations. It is highly improbable that this method will serve, for the reason that hexane is not now used to the same extent as formerly and the chances are that heptane and octane will have to be taken into account.

TABLE OF APPROXIMATE CAPACITIES IN LIQUID GALLONS

1	2	3	4	5	6	7	8	9	10	Gallons	Gal'ns per Inch
5x12	6x18	6x24	6x36	6x42						6" diam'r	.122
	7x12	7x18	7x24	7x30	7x36	7x42	7x48			7" "	.165
		8x15	8x18	8x24	8x30	8x36	8x42	8x45	8x48	8" "	.217
		9x12	9x15	9x18	9x24	9x30	9x34	9x36	9x40	9" "	.275
					10x20	10x24	10x26	10x28	10x32	10" "	.340
						12x16	12x18	12x20	12x24	12" "	.486

10	15	20	25	30	35	40	45	50	Gallons	Gal'ns per Inch
8x48									8" diam'r	.217
9x40									9" "	.275
10x32	10x48								10" "	.340
12x24	12x34	12x42	12x50	12x60					12" "	.486
14x18	14x24	14x30	14x38	14x44	14x52	14x60			14" "	.666
	16x18	16x24	16x30	16x36	16x42	16x48	16x54	16x60	16" "	.870

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MEASURING THE CONTENTS OF HORIZONTAL CYLINDRICAL TANKS

In a horizontally disposed cylindrical tank the contents cannot be measured without the knowledge of certain geometrical relations existing between the height at which the liquid stands and the volume it occupies. These are given hereafter: 1st, In relation of volume to height; 2nd, In relation of height to volume.

V = total volume of tank;
v = volume occupied by liquid;
D = diameter of tank;
h = height of liquid in tank.

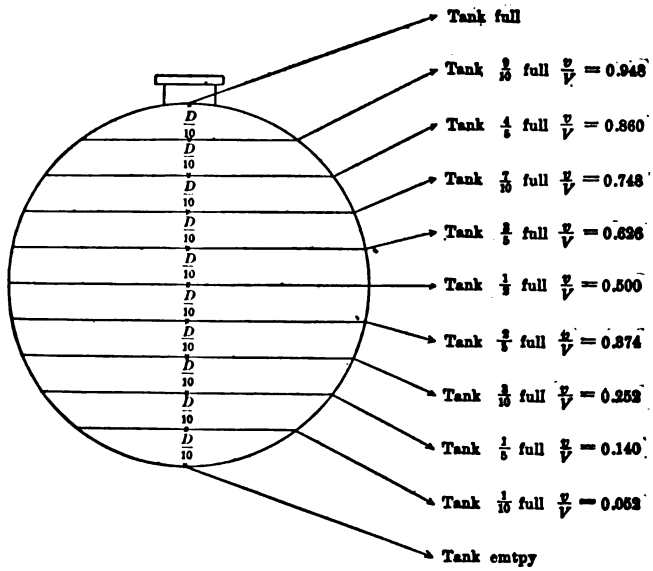

Fig. 1 -Tank divided into 10 parts of equal height. (Case in which measurement is taken with an ordinary foot rule.)

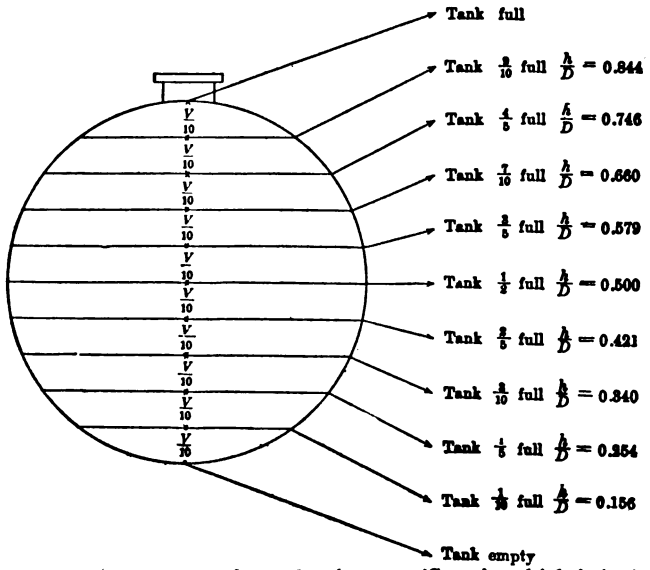

Fig. 2.—Tank divided in 10 parts of equal volume. (Case in which it is desired to make a gauge for a given tank.)

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TABLE FOR THE DIVISION OF THE CIRCUMFERENCE

Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius	Number of Divisions in the Circumference	Angle of Corresponding Division of Circle; Degrees	Length of Chord in Decimal Fraction of Radius
3	120	1.73206	52	6.55	0.120356
4	90	1.41422	53	6.47	0.118032
5	72	1.17558	54	6.40	0.11629
6	60	1	55	6.32	0.113966
7	51.25	0.86732	56	6.25	0.111644
8	45	0.76536	57	6.18	0.1099
9	40	0.68404	58	6.12	0.108158
10	36	0.61804	59	6.06	0.106414
11	32.43	0.563	60	6	0.104672
12	30	0.51764	61	5.54	0.102928
13	27	0.4782	62	5.48	0.101186
14	25	0.4448	63	5.42	0.099442
15	24	0.41582	64	5.37	0.0977
16	22.30	0.39018	65	5.32	0.096538
17	21.10	0.36734	66	5.27	0.094794
18	20	0.3473	67	5.22	0.093632
19	18.56	0.32894	68	5.17	0.091888
20	18	0.31286	69	5.13	0.090765
21	17.08	0.29792	70	5.08	0.089564
22	16.21	0.2841	71	5.04	0.088402
23	15.39	0.272	72	5	0.087238
24	15	0.26106	73	4.55	0.085496
25	14.24	0.25066	74	4.51	0.084332
26	13.50	0.24086	75	4.48	0.083752
27	13.20	0.23218	76	4.44	0.083588
28	12.51	0.22352	77	4.40	0.081426
29	12.24	0.216	78	4.36	0.080264
30	12	0.20906	79	4.33	0.0791
31	11.36	0.20212	80	4.30	0.078518
32	11.15	0.19574	81	4.26	0.077356
33	10.54	0.18996	82	4.23	0.076194
34	10.35	0.18416	83	4.20	0.075612
35	10.17	0.17894	84	4.17	0.07445
36	10	0.17432	85	4.14	0.073868
37	9.43	0.1691	86	4.11	0.072706
38	9.28	0.16504	87	4.08	0.072124
39	9.13	0.1604	88	4.05	0.070962
40	9	0.15692	89	4.02	0.07038
41	8.46	0.15286	90	4.	0.069798
42	8.34	0.14938	91	3.57	0.0686362
43	8.22	0.1459	92	3.54	0.0680546
44	8.10	0.14242	93	3.52	0.0674732
45	8	0.13952	94	3.49	0.0663104
46	7.49	0.13603	95	3.47	0.0657288
47	7.39	0.133128	96	3.45	0.0651474
48	7.30	0.130806	97	3.42	0.064566
49	7.20	0.127904	98	3.40	0.0639844
50	7.12	0.125582	99	3.38	0.63403
51	7.03	0.122678	100	3.36	0.0628216

This table should be useful for gear and chain wheel calculation and design

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CIRCUMFERENCES AND AREAS OF CIRCLES

ADVANCING BY EIGHTHS

Diam.	Circum.	Area	Diam.	Circum.	Area	Diam.	Circum.	Area
1/64	.04909	.00019	2 3/8	7.4613	4.4301	6 1/8	19.242	29.465
1/32	.09818	.00077	7/16	7.6576	4.6664	1/4	19.635	30.680
3/64	.14726	.00173	1/2	7.8540	4.9087	3/8	20.028	31.919
1/16	.19635	.00307	9/16	8.0503	5.1572	1/2	20.420	33.183
3/32	.29452	.00690	5/8	8.2467	5.4119	5/8	20.813	34.472
1/8	.39270	.01227	11/16	8.4430	5.6727	3/4	21.206	35.785
5/32	.49087	.01917	3/4	8.6394	5.9396	7/8	21.598	37.122
3/16	.58905	.02761	13/16	8.8357	6.2126	7	21.991	38.485
7/32	.68722	.03758	7/8	9.0321	6.4918	1/8	22.384	39.871
			15/16	9.2284	6.7771	1/4	22.776	41.282
1/4	.78540	.04909				3/8	23.169	42.718
9/32	.88357	.05213	3	9.4284	7.0686	1/2	23.562	44.179
5/16	.98175	.07670	1/16	9.6211	7.3662	5/8	23.955	45.664
11/32	1.0799	.09281	1/8	9.8175	7.6699	3/4	24.347	47.173
3/8	1.1781	.11045	3/16	10.014	7.9798	7/8	24.740	48.707
13/32	1.2763	.12962	1/4	10.210	8.2958	8	25.133	50.265
7/16	1.3744	.15033	5/16	10.407	8.6179	1/8	25.525	51.849
15/32	1.4726	.17257	3/8	10.603	8.9462	1/4	25.918	53.456
			7/16	10.799	9.2806	3/8	26.311	55.088
1/2	1.5708	.19635	1/2	10.996	9.6211	1/2	26.704	56.745
17/32	1.6690	.22166	9/16	11.192	9.9678	5/8	27.096	58.426
9/16	1.7671	.24850	5/8	11.388	10.321	3/4	27.489	60.132
19/32	1.8653	.27688	11/16	11.585	10.680	7/8	27.882	61.862
5/8	1.9635	.30680	3/4	11.781	11.045	9	28.274	63.617
21/32	2.0617	.33824	13/16	11.977	11.416	1/8	28.667	65.397
11/16	2.1598	.37122	7/8	12.174	11.793	1/4	29.060	67.201
23/32	2.2580	.40574	15/16	12.370	12.177	3/8	29.452	69.029
			4	12.566	12.566	1/2	29.845	70.882
3/4	2.3562	.44179	1/16	12.763	12.962	5/8	30.238	72.760
25/32	2.4544	.47937	1/8	12.959	13.364	3/4	30.631	74.662
13/16	2.5525	.51849	3/16	13.155	13.772	7/8	31.023	76.589
27/32	2.6507	.55914	1/4	13.352	14.186	10	31.416	78.540
7/8	2.7489	.60132	5/16	13.548	14.607	1/8	31.809	80.516
29/32	2.8471	.64504	3/8	13.744	15.033	1/4	32.201	82.516
15/16	2.9452	.69029	7/16	13.941	15.466	3/8	32.594	84.541
31/32	3.0434	.73708	1/2	14.137	15.904	1/2	32.987	86.590
			9/16	14.334	16.349	5/8	33.379	88.664
1	3.1416	.7854	5/8	14.530	16.800	3/4	33.772	90.763
1/16	3.3379	.8866	11/16	14.726	17.257	7/8	34.165	92.886
1/8	3.5343	.9940	3/4	14.923	17.728	11	34.558	95.033
3/16	3.7306	1.1075	13/16	15.119	18.190	1/8	34.950	97.205
1/4	3.9270	1.2272	7/8	15.315	18.665	1/4	35.343	99.402
5/16	4.1233	1.3530	15/16	15.512	19.147	3/8	35.736	101.62
3/8	4.3197	1.4849	5	15.708	19.635	1/2	36.128	103.87
7/16	4.5160	1.6230	1/16	15.904	20.129	5/8	36.521	106.14
1/2	4.7124	1.7671	1/8	16.101	20.629	3/4	36.914	108.43
9/16	4.9087	1.9175	3/16	16.297	21.135	7/8	37.306	110.75
5/8	5.1051	2.0739	1/4	16.493	21.648	12	37.699	113.10
11/16	5.3014	2.2365	5/16	16.690	22.166	1/8	38.092	115.47
3/4	5.4978	2.4053	3/8	16.886	22.691	1/4	38.485	117.86
13/16	5.6941	2.5802	7/16	17.082	23.221	3/8	38.877	120.28
7/8	5.8905	2.7612	1/2	17.279	23.758	1/2	39.270	122.72
15/16	6.0868	2.9483	9/16	17.475	24.301	5/8	39.663	125.19
			5/8	17.671	24.850	3/4	40.055	127.68
2	6.2832	3.1416	11/16	17.868	25.406	7/8	40.448	130.19
1/16	6.4795	3.3410	3/4	18.064	25.967	13	40.841	132.73
1/8	6.6759	3.5466	13/16	18.261	26.535	1/8	41.233	135.30
3/16	6.8722	3.7583	7/8	18.457	27.109	1/4	41.626	137.89
1/4	7.0686	3.9761	15/16	18.653	27.688	3/8	42.019	140.50
5/16	7.2649	4.2000	6	18.850	28.274	1/2	42.412	143.14

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AREAS OF SMALL CIRCLES

Diameter	Areas									
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0	.000078	.00031	.0007	.00125	.00196	.00283	.00385	.00503	.00636
.1	.0078	.0095	.0113	.0133	.0154	.0177	.0201	.0227	.0255	.0283
.2	.0314	.03464	.038	.0415	.0452	.0491	.0531	.0572	.0616	.066
.3	.0706	.0755	.0804	.0855	.0908	.0962	.1018	.1075	.1134	.1195
.4	.1256	.132	.1385	.1452	.1520	.1590	.1662	1735	.181	.1886
.5	.1963	.2043	.2124	.2206	.2290	.2376	.2463	.2552	.2642	.2734
.6	.2827	.2922	.3014	.3117	.3217	.3318	.3421	.3526	.3632	.3739
.7	.3848	.3959	.4071	.4185	.4301	.4418	.4536	.4657	.4778	.4902
.8	.5026	.5153	.5281	.5411	.5542	.5674	.5809	.5945	.6082	.6221
.9	.6362	.6504	.6648	.6793	.694	.7088	.7238	.739	.7543	.7698

DECIMAL EQUIVALENTS OF FRACTIONS OF AN INCH

1/64 = .0156	17/64 = .2656	33/64 = .5156	49/64 = .7656
1/32 = .0312	9/32 = .2812	17/32 = .5312	25/32 = .7812
3/64 = .0468	19/64 = .2968	35/64 = .5468	51/64 = .7968
1/16 = .0625	5/16 = .3125	9/16 = .5625	13/16 = .8125
5/64 = .0781	21/64 = .3281	37/64 = .5781	53/64 = .8281
3/32 = .0937	11/32 = .3437	19/32 = .5937	27/32 = .8437
7/64 = .1093	23/64 = .3593	39/64 = .6093	55/64 = .8593
1/8 = .1250	3/8 = .3750	5/8 = .6250	7/8 = .8750
9/64 = .1406	25/64 = .3906	41/64 = .6406	57/64 = .8906
5/32 = .1562	13/32 = .4062	21/32 = .6562	29/32 = .9062
11/64 = .1718	27/64 = .4218	43/64 = .6718	59/64 = .9218
3/16 = .1875	7/16 = .4375	11/16 = .6875	15/16 = .9375
13/64 = .2031	29/64 = .4531	45/64 = .7031	61/64 = .9531
7/32 = .2187	15/32 = .4687	23/32 = .7187	31/32 = .9687
15/64 = .2343	31/64 = .4843	47/64 = .7343	63/64 = .9843
1/4 = .2500	1/2 = .5000	3/4 = .7500	1 = 1.0000

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THERMOMETER SCALES

There are two thermometer scales in general use in the United States: Fahrenheit and Centigrade. In the Fahrenheit thermometer the temperature of melting ice is taken at 32 degrees and boiling point at 212 degrees; thus there are 180 degrees between the two extremes. In the Centigrade thermometer the distance between these two points on the scale is divided into exactly 100 degrees. In order to convert degrees Fahrenheit into degrees Centigrade: Subtract 32, multiply the remainder by 5, and divide by 9. Thus, convert 158 degrees Fahrenheit to degrees Centigrade:

$$\text{Then } (158-32)\frac{5}{9}=70^\circ \text{ Cent.}$$

Or to convert degrees Centigrade into degrees Fahrenheit: Multiply by 9, divide by 5 and add 32. Thus, convert 70 degrees Centigrade into degrees Fahrenheit:

$$\text{Then } (70\times\frac{9}{5})+32=158^\circ \text{ Fahr.}$$

Following is a table giving the equivalent degrees of the Fahrenheit and Centigrade scales, from 1 to 100 Centigrade:

Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.
0	*32.0	35	95.0	70	158.0
1	33.8	36	96.8	71	159.8
2	35.6	37	98.6	72	161.6
3	37.4	38	100.4	73	163.4
4	39.2	39	102.2	74	165.2
5	41.0	40	104.0	75	167.0
6	42.8	41	105.8	76	168.8
7	44.6	42	107.6	77	170.6
8	46.4	43	109.4	78	172.4
9	48.2	44	111.2	79	174.2
10	50.0	45	113.0	80	176.0
11	51.8	46	114.8	81	177.8
12	53.6	47	116.6	82	179.6
13	55.4	48	118.4	83	181.4
14	57.2	49	120.2	84	183.2
15	59.0	50	122.0	85	185.0
16	60.8	51	123.8	86	186.8
17	62.6	52	125.6	87	188.6
18	64.4	53	127.4	88	190.4
19	66.2	54	129 2	89	192.2
20	68.0	55	131.0	90	194.0
21	69.8	56	132.8	91	195.8
22	71.6	57	134.6	92	197.6
23	73.4	58	136.4	93	199.4
24	75.2	59	138.2	94	201.2
25	77.0	60	140.0	95	203.0
26	78.8	61	141.8	96	204.8
27	80.6	62	143.6	97	206.6
28	82.4	63	145.4	98	208.4
29	84.2	64	147.2	99	210.2
30	86.0	65	149.0	100	†212.0
31	87.8	66	150.8	..	.....
32	89.6	67	152.6	..	.....
33	91.4	68	154.4	..	.....
34	93.2	69	156.2	..	.....

* Freezing point.
† Boiling point.

It will be noticed that for each degree Centigrade the Fahrenheit scale rises 1.8 degrees, so that if we multiply the degrees Centigrade by 1.8 and add 32 we will get the equivalent number of degrees Fahrenheit. In the Fahrenheit thermometer the freezing and boiling points of water are taken at the mean atmospheric pressure at the sea level, 14.7 pounds to the square inch.

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FORMULAS FOR CONVERSION OF THERMOMETER SCALES

To convert degrees, Centigrade or Réaumur, into degrees Fahrenheit·
Let F = No. of degrees Fahrenheit.
C = " " " Centigrade.
R = " " " Réaumur.

$$F = \frac{9C}{5} + 32; \qquad F = \frac{9R}{4} + 32;$$

$$C = \frac{5\,(F - 32)}{9} \qquad R = \frac{4\,(F - 32)}{9}$$

Freezing point, or 32° Fah. = zero in Cent. or Réaumur.
Boiling point, or 212° Fah. = 100° Cent., or 80° Réaumur.

BAUME HYDROMETER AND SPECIFIC GRAVITY EQUIVALENTS (AMERICAN STANDARD)

For liquids heavier than water,

$$\text{Sp. Gr.} = \frac{145}{145 - {}^{\circ}\text{Bé}} \text{ at } 60^{\circ}\text{ F.}$$

Baumé	Specific Gravity	Baumé	Specific Gravity	Baumé	Specific Gravity
0.0	1.000	17.5	1.137	35.0	1.318
0.5	1.003	18.0	1.141	36.0	1.330
1.0	1.006	18.5	1.146	37.0	1.342
1.5	1.010	19.0	1.150	38.0	1.355
2.0	1.014	19.5	1.155	39.0	1.367
2.5	1.017	20.0	1.160	40.0	1.381
3.0	1.021	20.5	1.164	45.0	1.450
3.5	1.024	21.0	1.169	50.0	1.526
4.0	1.028	21.5	1.174	55.0	1.611
4.5	1.032	22.0	1.178	60.0	1.705
5.0	1.035	22.5	1.183	65.0	1.812
5.5	1.039	23.0	1.188	70.0	1.933
6.0	1.043	23.5	1.193	....	.....
6.5	1.046	24.0	1.198	....	.....
7.0	1.050	24.5	1.203	....	....
7.5	1.054	25.0	1.208	....	.....
8.0	1.058	25.5	1.213	....	....
8.5	1.062	26.0	1.218	....	.....
9.0	1.066	26.5	1.223	....	.....
9.5	1.070	27.0	1.228	....	....
10.0	1.074	27.5	1.234	....	.....
10.5	1.078	28.0	1.239	....	.....
11.0	1.082	28.5	1.244	....	.....
11.5	1.086	29.0	1.250	....	.....
12.0	1.090	29.5	1.255	....	.....
12.5	1.094	30.0	1.260	....	....
13.0	1.098	30.5	1.266	....	....
13.5	1.102	31.0	1.271	....	....
14.0	1.106	31.5	1.277	....	....
14.5	1.111	32.0	1.283	....	....
15.0	1.115	32.5	1.288	....	....
15.5	1.119	33.0	1.294	....	.....
16.0	1.124	33.5	1.300	....	.....
16.5	1.128	34.0	1.306	....	.....
17.0	1.132	34.5	1.312	....	.....

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BOILING POINT OF WATER AT VARIOUS ALTITUDES

Altitude Above Sea Level in Feet	Boiling Point of Water in Degrees Fahrenheit
1,025	212
2,063	210
3,115	208
4,169	206
5,225	204
6,304	202
7.381	200
8,431	198
9,579	196
10,685	194
	192

It is considered good practice to maintain the temperature of the water in an automobile motor cooling system at about 202 degrees Fahrenheit, under normal operating conditions. This allows a working margin, under boiling point, for adverse conditions, such as climbing a long grade, car standing with motor running idle, or running with a retarded spark. Such a system would steam when a car running under normal conditions attained an altitude of about one mile. In cases where steaming occurs under normal conditions, at sea level, mountain climbing is practically impossible or necessitates very frequent stops for water to make up for evaporation.

DECIMAL FRACTIONS OF A LINEAL INCH IN MILLIMETRES

Inch	Milli-metres	Inch	Milli-metres	Inch	Milli-metres	Inches	Milli-metres
.01	.254	.29	7.366	.57	14.478	.85	21.590
.02	.508	.30	7.620	.58	14.732	.86	21.844
.03	.762	.31	7.874	.59	14.986	.87	22.098
.04	1.016	.32	8.128	.60	15.240	.88	22.352
.05	1.270	.33	8.382	.61	15.494	.89	22.606
.06	1.254	.34	8.636	.62	15.748	.90	22.860
.07	1.778	.35	8.890	.63	16.002	.91	23.114
.08	2.032	.36	9.114	.64	16.256	.92	23.368
.09	2.286	.37	9.398	.65	16.510	.93	23.622
.10	2.540	.38	9.652	.66	16.764	.94	23.876
.11	2.794	.39	9.906	.67	17.018	.95	24.130
.12	3.048	.40	10.160	.68	17.272	.96	24.384
.13	3.302	.41	10.414	.69	17.526	.97	24.638
.14	3.556	.42	10.668	.70	17.780	.98	24.892
.15	3.810	.43	10.922	.71	18.034	.99	25.146
.16	4.064	.44	11.176	.72	18.288	1.00	25.400
.17	4.318	.45	11.430	.73	18.542	2.00	50.799
.18	4.572	.46	11.684	.74	18.796	3.00	76.199
.19	4.826	.47	11.938	.75	19.050	4.00	101.598
.20	5.080	.48	12.192	.76	19.304	5.00	126.998
.21	5.334	.49	12.446	.77	19.558	6.00	152.397
.22	5.588	.50	12.700	.78	19.812	7.00	177.797
.23	5.842	.51	12.945	.79	20.066	8.00	203.196
.24	6.096	.52	13.208	.80	20.320	9.00	228.596
.25	6.350	.53	13.462	.81	20.574	10.00	253.995
.26	6.604	.54	13.716	.82	20.828	11.00	279.395
.27	6.858	.55	13.970	.83	21.082	12.00	304.794
.28	7.112	.56	14.224	.84	21.336	1 foot	

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UNITED STATES OFFICIAL MILLIMETERS CONVERSION TABLE

Millimeters	Equivalent in Inches	Millimeters	Equivalent in Inches
1	0.03,937	51	2.00,787
2	0.07,874	52	2.04,724
3	0.11,811	53	2.08,661
4	0.15,748	54	2.12,598
5	0.19,685	55	2.16,535
6	0.23,622	56	2.20,472
7	0.27,559	57	2.24,409
8	0.31,496	58	2.28,346
9	0.35,433	59	2.32,283
10	0.39,370	60	2.36,220
11	0.43,307	61	2.40,157
12	0.47,244	62	2.44,094
13	0.51,181	63	2.48,031
14	0.55,118	64	2.51,968
15	0.59,055	65	2.55,905
16	0.62,992	66	2.59,842
17	0.66,929	67	2.63,779
18	0.70,866	68	2.67,716
19	0.74,803	69	2·71,653
20	0.78,740	70	2.75,590
21	0.82,677	71	2.79,527
22	0.86,614	72	2.83,464
23	0.90,551	73	2.87,401
24	0.94,488	74	2.91,338
25	0.98,425	75	2.95,275
26	1.02,362	76	2.99,212
27	1.06,299	77	3.03,149
28	1.10,236	78	3.07,086
29	1.14,173	79	3.11,023
30	1.18,110	80	3.14,960
31	1.22,047	81	3.18,897
32	1.25,984	82	3.22,834
33	1.29,921	83	3.26,771
34	1.33,858	84	3.30,708
35	1.37,795	85	3.34,645
36	1.41,732	86	3.38,582
37	1.45,669	87	3.42,519
38	1.49,606	88	3.46,456
39	1.53,543	89	3.50,393
40	1.57,480	90	3.54,330
41	1.61,417	91	3.58,267
42	1.65,354	92	3.62,204
43	1.69,291	93	3.66,141
44	1.73,228	94	3.70,078
45	1.77,165	95	3.74,015
46	1.81,102	96	3.77,952
47	1.85,039	97	3.81,889
48	1.88,976	98	3.85.826
49	1.92,913	99	3.89,763
50	1.96,850	100	3.93,700

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POUNDS PER SQUARE INCH IN KILOGRAMMES PER SQUARE CENTIMETRE

Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre	Lbs. per Square Inch	Kilo-grammes per Square Centimetre
1	.0703	41	2.8826	81	5.6949	205	14.4129
2	.1406	42	2.9529	82	5.7652	210	14.7645
3	.2109	43	3.0232	83	5.8355	215	15.1160
4	.2812	44	3.0935	84	5.9058	220	15.4675
5	.3515	45	3.1638	85	5.9761	225	15.8191
6	.4218	46	3.2341	86	6.0464	230	16.1706
7	.4921	47	3.3044	87	6.1167	235	16.5221
8	.5624	48	3.3747	88	6.1870	240	16.8737
9	.6328	49	3.4450	89	6.2573	245	17.2252
10	.7031	50	3.5153	90	6.3276	250	17.5767
11	.7734	51	3.5856	91	6.3979	255	17.9283
12	.8437	52	3.6559	92	6.4682	260	18.2798
13	.9140	53	3.7263	93	6.5385	265	18.6313
14	.9843	54	3.7966	94	6.6088	270	18.9829
15	1.0546	55	3.8669	95	6.6722	275	19.3344
16	1.1249	56	3.9372	96	6.7495	280	19.6860
17	1.1952	57	4.0075	97	6.8198	285	20.0375
18	1.2655	58	4.0778	98	6.8901	290	20.3890
19	1.3358	59	4.1481	99	6.9604	295	20.7406
20	1.4062	60	4.2184	100	7.0307	300	21.0921
21	1.4764	61	4.2887	105	7.3822	310	21.7951
22	1.5467	62	4.3590	110	7.7338	320	22.4981
23	1.6171	63	4.4293	115	8.0853	330	23.2012
24	1.6874	64	4.4996	120	8.4368	340	23.9043
25	1.7577	65	4.5699	125	8.7884	350	24.6073
26	1.8280	66	4.6402	130	9.1399	360	25.3104
27	1.8983	67	4.7106	135	9.4914	370	26.0135
28	1.9686	68	4.7809	140	9.8430	380	26.7166
29	2.0389	69	4.8512	145	10.1945	390	27.4196
30	2.1092	70	4.9215	150	10.5460	400	28.1227
31	2.1795	71	4.9918	155	10.8976	410	28.8258
32	2.2498	72	5.0621	160	11.2491	420	29.5288
33	2.3201	73	5.1324	165	11.6006	430	30.2319
34	2.3905	74	5.2027	170	11.9522	440	30.9350
35	2.4607	75	5.2730	175	12.3037	450	31.6380
36	2.5310	76	5.3433	180	12.6553	460	32.3411
37	2.6013	77	5.4136	185	13.0068	470	33.0442
38	2.6717	78	5.4939	190	13.3583	480	33.7437
39	2.7420	79	5.5542	195	13.7099	490	34.4503
40	2.8123	80	5.6246	200	14.0614	500	35.1533

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A CONVENIENT METRIC CONVERSION (Compiled by C. W. HUNT)

Millimeters × .03937 = inches.
Millimeters ÷ 25.4 = inches.
Centimeters × .3937 = inches.
Centimeters ÷ 2.54 = inches.
Meters = 39.37 inches. (Act of Congress.)
Meters × 3.281 = feet.
Meters × 1.094 = yards.
Meter per second = 196.86 feet per minute.
Kilometers × .621 = miles.
Kilometers × 3280.7 = feet.
Square Millimeters × .00155 = square inches.
Square Millimeters ÷ 645.1 = square inches.
Square Centimeters × .155 = square inches.
Square Centimeters ÷ 6.451 = square inches.
Square Meters × 10.764 = square feet.
Square Kilometers × 247.1 = acres.
Hectares × 2.471 = acres.
Cubic Centimeters ÷ 16.383 = cubic inches.
Cubic Meters × 35.315 = cubic feet.
Cubic Meters × 1.308 = cubic yards.
Cubic Meters × 264.2 = gallons (231 cubic inches).
Liters × 61.022 = cubic inches. (Act of Congress.)
Liters × .2642 = gallons (231 cubic inches).
Liters ÷ 3.78 = gallons (231 cubic inches).
Liters ÷ 28.316 = cubic feet.
Grammes × 15.432 = grains. (Act of Congress.)
Grammes (water) ÷ 29.57 = fluid ounces.
Grammes ÷ 28.35 = ounces avoirdupois.
Grammes per cubic cent. ÷ 27.7 = pounds per cubic inch.
Joule × .7373 = foot pounds.
Kilograms × 2.2046 = pounds.
Kilograms × 35.3 = ounces avoirdupois.
Kilograms ÷ 1102.3 = tons (2,000 pounds).
Kilograms per square millimeters × 1422.3 = pounds per square inch
Kilograms per square cent. × 14 223 = pounds per square inch.
Kilo-watts × 1.34 = horse-power.
Watts ÷ 746 = horse-power.
Caloric × 3.968 = B. T. U.
Cheval vapeur × .9863 = horse-power.
(Centigrade × 1.8) + 32 = degrees Fahrenheit.
Francs × .193 = dollars.

FRENCH AND AMERICAN EQUIVALENT MEASURES

MEASURES OF LENGTH

French	*United States*
1 meter	39.37 inches, or 3.28083 feet
.3048 meter	1 foot
1 centimeter	.3937 inch
2.54 centimeters	1 inch.
1 millimeter	.03937 inch, or 1/25 inch nearly
25.4 millimeters	1 inch
1 kilometer	1093.61 yards, or .62137 mile

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MEASURES OF WEIGHT

1 gramme	15.432 grains
.0648 gramme	1 grain
28.35 grammes	1 ounce avoirdupois
1 kilogramme	2.2046 pounds
.4536 kilogramme	1 pound
1 tonne or metric ton	.9842 ton of 2,240 pounds 19.68 cwt.
1000 kilogrammes	2204.6 pounds

MEASURES OF CAPACITY

Liter (1 cubic decimeter)	61.023 cubic inches .03531 cubic foot .2642 gallon (American) 2.202 pounds water at 62° F.
8.317 liters	1 cubic foot
4.543 liters	1 gallon (British)
3.785 liters	1 gallon (American)

TABLE OF KILOGRAMME CALORIES, EQUIVALENT TO BRITISH THERMAL UNITS

Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l
0	.....	.252	.504	.756	1.008	1.260	1.512	1.764	2.016	2.268	0
10	2.52	2.772	3.024	3.276	3.528	3.780	4.032	4.284	4.536	4.788	10
20	5.04	5.292	5.544	5.796	6.048	6.300	6.552	6.804	7.056	7.308	20
30	7.56	7.812	8.064	8.316	8.568	8.820	9.072	9.324	9.576	9.828	30
40	10.08	10.332	10.584	10.836	11.088	11.340	11.592	11.844	12.096	12.348	40
50	12.60	12.852	13.104	13.356	13.608	13.860	14.112	14.364	14.616	14.868	50
50	15.12	15.372	15.624	15.876	16.128	16.380	16.632	16.884	17.136	17.388	60
70	17.64	17.892	18.144	18.396	18.648	18.900	19.152	19.404	19.656	19.908	70
80	20.16	20.412	20.664	20.916	21.168	21.420	21.672	21.924	22.176	22.428	80
90	22.68	22.932	23.184	23.436	23.688	23.940	24.192	24.444	24.696	24.948	90
Brit. Th'm'l	0	1	2	3	4	5	6	7	8	9	Brit. Th'm'l

1 British thermal unit = 251.996 therms, or gramme calories.

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LIST OF NINE DIFFERENT STANDARD GAUGES USED IN THE UNITED STATES

DECIMAL EQUIVALENTS (Inches)

No. of Gauge	American or Brown & Sharpe Iron Wire	Birmingham or Stubbs Iron Wire	Washburn & Moen Iron Wire	Imperial Wire Gauge	U. S. Standard for Plate (Iron & Steel)	Stubbs Steel Wire	Twist Drill and Steel Wire	Washburn & Moen Music Wire	Wood and Machine Screws	No. of Gauge	Fractional Parts of an Inch	Decimal Equiv. of Sixty-fourths, etc.
8-0	.....	.....	.....	.....	.....	.....	This gauge	.0083	....	8-0	1/64	.01563
7-0	.....	.....	.....	.....	.500	.....	from one to	.0087	....	7-0	1/32	.03125
6-0	.....	.....	.....	.464	.469	.....	three thous-	.0095	....	6-0	1/16	.625
5-0	.....	.....	.....	.432	.438	.....	andths larger	.010	....	5-0	5/64	.07813
4-0	.460	.454	.394	.400	.406	.....	than same Nos.	.011	....	4-0	3/32	.09375
3-0	.410	.425	.363	.372	.375	.....	of Stubbs steel	.012	.032	3-0	7/64	.10938
2-0	.365	.380	.331	.348	.344	.....	wire gauge	.013	.045	2-0	1/8	.125
0	.325	.340	.307	.334	.313	.....		.014	.058	0	9/64	.14063
1	.289	.300	.283	.300	.281	.277	.228	.016	.071	1	5/32	.15625
2	.258	.284	.263	.276	.266	.219	.221	.017	.084	2	11/64	.17188
3	.229	.259	.244	.252	.250	.212	.213	.018	.097	3	3/16	.1875
4	.204	.238	.225	.232	.234	.207	.209	.019	.110	4	13/64	.20313
5	.182	.220	.207	.212	.219	.204	.206	.020	.124	5	7/32	.21875
6	.162	.203	.192	.192	.203	.201	.204	.022	.137	6	15/64	.23438
7	.144	.180	.177	.176	.188	.199	.201	.023	.150	7	1/4	.25
8	.128	.165	.162	.160	.172	.197	.199	.024	.163	8	17/64	.26563
9	.114	.148	.148	.144	.156	.194	.196	.026	.176	9	9/32	.28125
10	.102	.134	.135	.128	.141	.191	.194	.027	.189	10	19/64	.29688
11	.091	.120	.121	.116	.125	.188	.191	.028	.203	11	5/16	.3125
12	.081	.109	.106	.104	.109	.185	.189	.030	.216	12	21/64	.32813
13	.072	.095	.092	.092	.094	.182	.185	.031	.229	13	11/32	.34375
14	.064	.083	.080	.080	.078	.180	.182	.033	.242	14	23/64	.35938
15	.057	.072	.072	.072	.070	.178	.180	.035	.255	15	3/8	.375
16	.051	.065	.063	.064	.063	.175	.177	.036	.268	16	25/64	.39063
17	.045	.058	.054	.056	.056	.172	.173	.038	.282	17	13/32	.40625
18	.040	.049	.048	.048	.050	.168	.170	.040	.295	18	27/64	.42188
19	.036	.042	.041	.040	.044	.164	.166	.041	.308	19	7/16	.4375
20	.032	.035	.035	.036	.038	.161	.161	.043	.321	20	29/64	.45313
21	.028	.032	.032	.032	.034	.157	.159	.046	.334	21	15/32	.46875
22	.025	.028	.029	.028	.031	.155	.157	.048	.347	22	31/64	.48438
23	.023	.025	.026	.024	.028	.153	.154	.051	.360	23	1/2	.5
24	.020	.022	.023	.022	.025	.151	.152	.055	.374	24	33/64	.51563
25	.018	.020	.020	.020	.022	.148	.150	.059	.387	25	17/32	.53125
26	.016	.018	.018	.018	.019	.146	.147	.063	.400	26	35/64	.54688
27	.0141	.016	.0173	.0164	.0171	.143	.144	.066	.413	27	9/16	.5625
28	.0126	.014	.0162	.0149	.0156	.139	.141	.072	.426	28	37/64	.57813
29	.0112	.013	.015	.0136	.014	.134	.136	.076	.439	29	19/32	.59375
30	.010	.012	.014	.0124	.0125	.127	.129	.080	.453	30	39/64	.60938
31	.0089	.010	.0132	.0116	.0109	.120	.120	....	.466	31	5/8	.625
32	.0079	.009	.0128	.0108	.0101	.115	.116	....	.479	32	41/64	.64063
33	.007	.008	.0118	.010	.0093	.112	.113	....	.492	33	21/32	.65625
34	.0063	.007	.0104	.0092	.0085	.110	.111	....	.505	34	43/64	.67188
35	.0056	.005	.0095	.0084	.0078	.108	.110	....	.518	35	11/16	.6875
36	.005	.004	.009	.0076	.007	.106	.1065	....	.532	36	45/64	.70313
37	.0044	.....	.....	.0068	.0066	.103	.104	....	.545	37	23/32	.71875
38	.0039	.....	.....	.006	.0062	.101	.1015	....	.558	38	47/64	.73438
39	.0035	.....	.....	.0052	.....	.099	.0995	....	.571	39	3/4	.75
40	.0031	.....	.....	.0048	.....	.097	.098	....	.584	40	49/64	.76563
41	.....	.....	.....	.....	.....	.095	.096	....	.597	41	25/32	.78125
42	.....	.....	.....	.....	.....	.092	.094	....	.611	42	51/64	.79688
43	.....	.....	.....	.....	.....	.088	.089	....	.624	43	13/16	.8125
44	.....	.....	.....	.....	.....	.085	.086	....	.637	44	53/64	.82813
45	.....	.....	.....	.....	.....	.081	.082	....	.650	45	27/32	.84375
46	.....	.....	.....	.....	.....	.079	.081	....	.663	46	55/64	.85938
47	.....	.....	.....	.....	.....	.077	.079	....	.676	47	7/8	.875
48	.....	.....	.....	.....	.....	.075	.076	....	.690	48	57/64	.89063
49	.....	.....	.....	.....	.....	.072	.073	....	.703	49	29/32	.90625
50	.....	.....	.....	.....	.....	.069	.070	....	.716	50	59/64	.92188

Letter Sizes Stubbs Steel Wire

A	.234	I	.272	R	.339
B	.238	J	.277	S	.348
C	.242	K	.281	T	.358
D	.246	L	.290	U	.368
E	.250	M	.295	V	.377
F	.257	N	.302	W	.386
G	.261	O	.316	X	.397
H	.266	P	.323	Y	.404
		Q	.332	Z	.413

Index to Tables and Data appears on Pages 23 to 26.

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SIZES OF NUMBERS OF THE UNITED STATES STANDARD GAUGE FOR SHEET AND PLATE IRON AND STEEL

An Act Establishing a Standard Gauge for Sheet and Plate Iron and Steel

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled: That for the purpose of securing uniformity the following is established as the only gauge for sheet and plate iron and steel in the United States of America namely:

Number of Gauge	Approximate Thickness in Fractions of an Inch	Approximate Thickness in Decimal Parts of an Inch	Weight per Square Foot in Ounces Avoirdupois	Weight per Square Foot in Pounds Avoirdupois
0000000	1/2	.5	320	20.00
000000	15/32	.46875	300	18.75
00000	7/16	.4375	280	17.50
0000	13/32	.40625	260	16.25
000	3/8	.375	240	15.00
00	11/32	.34375	220	13.75
0	5/16	.3125	200	12.50
1	9/32	.28125	180	11.25
2	17/64	.265625	170	10.625
3	1/4	.25	160	10.00
4	15/64	.234375	150	9.375
5	7/32	.21875	140	8.75
6	13/64	.203125	130	8.125
7	3/16	.1875	120	7.5
8	11/64	.171875	110	6.875
9	5/32	.15625	100	6.25
10	9/64	.140625	90	5.625
11	1/8	.125	80	5.00
12	7/64	.109375	70	4.375
13	3/32	.09375	60	3.75
14	5/64	.078125	50	3.125
15	9/128	.0703125	45	2.8125
16	1/16	.0625	40	2.5
17	9/160	.05625	36	2.25
18	1/20	.05	32	2.
19	7/160	.04375	28	1.75
20	3/80	.0375	24	1.50
21	11/320	.034375	22	1.375
22	1/32	.03125	20	1.25
23	9/320	.028125	18	1.25
24	1/40	.025	16	1.
25	7/320	.021875	14	.875
26	3/160	.01875	12	.75
27	11/640	.0171875	11	.6875
28	1/64	.015625	10	.625
29	9/640	.0140625	9	.5625
30	1/80	.0125	8	.5
31	7/640	.0109375	7	.4375
32	13/1280	.01015625	6½	.40625
33	3/320	.009375	6	.375
34	11/1280	.00859375	5½	.34375
35	5/640	.0078125	5	.3125
36	9/1280	.00703125	4½	.28125
37	17/2560	.006640625	4¼	.265625
38	1/160	.00625	4	.25

And on and after July first, eighteen hundred and ninety-three, the same and no other shall be used in determining duties and taxes levied by the United States of America on sheet and plate iron and steel. But this act shall not be construed to increase duties upon any articles which may be imported.

Sec. 3.—That in the practical use and application of the standard gauge hereby established a variation of two and one-half per cent. either way may be allowed.

Approved March 3. 1893.

Index to Tables and Data appears on Pages 23 to 26.

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WEIGHTS OF METALS

	Lbs. per Cu. Ft.	Lbs. per Cu. In.
Aluminum, cast	160	.0926
Brass, cast	506.3	.293
Brass, sheet	528	.3056
Babbitt metal	440.6	.255
Bronze, aluminum	471.2	.2727
Bronze, phosphor	575.8	.3332
Copper wire	555.1	.3212
Cast iron	450.	.2604
Wrought iron, bars	486.8	.2817
Steel, Bessemer	490.7	.284
Lead, cast	709.5	.4106
Nickel	548.7	.3175
Tin	458.3	.2652
Zinc	436.5	.2526

PROPORTIONATE WEIGHT OF CASTINGS TO WEIGHT OF WOOD PATTERNS

A Pattern Weighing One Pound, Made of (Less Weight of Core Prints)	Cast Iron	Brass	Copper	Bronze	Bell Metal	Zinc
Pine or Fir	16	15.8	16.7	16.3	17.1	13.5
Oak	9	10.1	10.4	10.3	10.9	8.6
Beech	9.7	10.9	11.4	11.3	11.9	9.1
Linden	13.4	15.1	16.7	15.5	16.3	12.9
Pear	10.2	11.5	11.9	11.8	12.4	9.8
Birch	10.6	11.9	12.3	12.2	12.9	10.2
Alder	12.8	14.3	14.9	14.7	15.5	12.2
Mahogany	11.7	13.2	13.7	13.5	14.2	11.2
Brass	0.85	0.95	0.99	0.98	1.0	0.81

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WEIGHT OF STEEL PER LINEAL FOOT

FLAT SIZES

	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1¾	2	2¼	2½	2¾	3	3½	4	5	6	7
⅛	.213	.266	.320	.372	.426	.479	.530	.585	.640	.745	.850	.955	1.07	1.18	1.28	1.49	1.70	2.13	2.56	2.98
9/16	.319	.399	.480	.558	.639	.718	.790	.878	.960	1.12	1.28	1.43	1.60	1.76	1.92	2.24	2.55	3.20	3.83	4.47
¼	.425	.533	.640	.743	.852	.958	1.06	1.17	1.28	1.49	1.70	1.91	2.13	2.34	2.56	2.98	3.40	4.26	5.11	5.96
5/16	.531	.665	.800	.929	1.06	1.20	1.33	1.46	1.60	1.86	2.13	2.39	2.66	2.92	3.19	3.72	4.25	5.32	6.38	7.44
⅜	.638	.798	.960	1.12	1.28	1.43	1.59	1.75	1.91	2.23	2.55	2.87	3.20	3.51	3.83	4.46	5.10	6.40	7.66	8.92
7/16	.744	.931	1.12	1.30	1.49	1.67	1.86	2.05	2.23	2.60	2.98	3.35	3.72	4.09	4.46	5.21	5.95	7.44	8.92	10.40
½	.....	1.07	1.28	1.49	1.70	1.91	2.13	2.34	2.55	2.98	3.40	3.83	4.26	4.68	5.10	5.96	6.80	8.52	10.20	11.90
9/16	.....	1.20	1.44	1.67	1.91	2.15	2.39	2.63	2.87	3.35	3.83	4.30	4.78	5.26	5.74	6.69	7.65	9.56	11.50	13.40
⅝	.....	.....	1.60	1.86	2.12	2.39	2.66	2.92	3.19	3.72	4.26	4.79	5.32	5.86	6.39	7.44	8.52	10.64	12.78	14.90
11/16	.....	.....	1.76	2.04	2.34	2.63	2.92	3.22	3.51	4.09	4.68	5.26	5.84	6.43	7.01	8.18	9.35	11.70	14.00	16.40
¾	.....	.....	.....	2.23	2.55	2.86	3.19	3.50	3.83	4.46	5.10	5.74	6.40	7.02	7.65	8.92	10.20	12.80	15.30	17.90
13/16	.....	.....	.....	2.41	2.76	3.11	3.45	3.80	4.14	4.83	5.53	6.22	6.91	7.60	8.29	9.67	11.10	13.80	16.60	19.30
⅞	.....	.....	.....	.....	2.98	3.34	3.72	4.09	4.46	5.21	5.96	6.70	7.46	8.19	8.94	10.42	11.92	14.87	17.88	20.80
15/16	.....	.....	.....	.....	3.19	3.59	3.98	4.38	4.78	5.58	6.38	7.17	7.97	8.77	9.56	11.20	12.80	15.90	19.10	22.40
1	.....	.....	.....	.....	.....	3.82	4.25	4.68	5.10	5.96	6.80	7.66	8.52	9.36	10.20	11.92	13.60	17.04	20.40	23.80
1⅛	.....	.....	.....	.....	.....	.....	4.78	5.27	5.74	6.71	7.65	8.61	9.59	10.54	11.48	13.41	15.30	19.17	22.95	26.80
1¼	.....	.....	.....	.....	.....	.....	.....	5.85	6.38	7.45	8.50	9.57	10.65	11.71	12.76	14.90	17.00	21.30	25.61	29.76
1½	.....	.....	.....	.....	.....	.....	.....	7.02	7.67	8.94	10.20	11.49	12.78	14.04	15.30	17.88	20.40	25.56	30.60	35.70

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WEIGHT IN POUNDS OF SHEET AND BAR ALUMINUM, BRASS AND STEEL

Thickness or Diam. in Inch		Sheets per Square Foot			Square Bars, One Foot Long			Round Bars, One Foot Long		
Fraction	Dec.	Alum.	Brass	Steel	Alum.	Brass	Steel	Alum.	Brass	Steel
1/16	.0625	.869	2.77	2.52	.004	.014	.013	.003	.011	.010
1/8	.125	1.739	5.55	5.10	.018	.057	.053	.014	.047	.042
3/16	.1875	2.609	8.32	7.65	.041	.131	.119	.032	.102	.094
1/4	.2500	3.479	11.10	10.20	.072	.230	.212	.057	.182	.167
5/16	.3125	4.348	13.87	12.75	.114	.380	.333	.089	.284	.261
3/8	.3750	5.218	16.64	15.30	.163	.520	.478	.128	.408	.375
7/16	.4375	6.088	19.42	17.85	.222	.708	.651	.174	.555	.511
1/2	.5000	6.958	22.20	20.40	.290	.925	.850	.227	.724	.667
9/16	.5625	7.827	24.97	22.95	.367	1.171	1.076	.288	.919	.845
5/8	.6250	8.697	27.74	25.50	.453	1.445	1.328	.356	1.136	1.043
11/16	.6875	9.567	30.52	28.05	.548	1.748	1.608	.430	1.372	1.262
3/4	.7500	10.436	33.29	30.60	.652	2.080	1.913	.516	1.646	1.502
13/16	.8125	11.306	36.07	33.15	.766	2.445	2.245	.601	1.917	1.763
7/8	.8750	12.175	38.84	35.70	.888	2.833	2.603	.697	2.223	2.044
15/16	.9375	13.045	41.61	38.25	1.019	3.251	2.989	.800	2.552	2.347
1	1.0000	13.915	44.39	40.80	1.159	3.697	3.400	.911	2.906	2.670
1 1/16	1.0625	14.784	47.16	43.35	1.309	4.176	3.838	1.028	3.279	3.014
1 1/8	1.125	15.654	49.94	45.90	1.467	4.630	4.303	1.152	3.675	3.379
1 3/16	1.1875	16.524	52.71	48.45	1.635	5.216	4.795	1.284	4.096	3.766
1 1/4	1.2500	17.394	55.48	51.00	1.812	5.780	5.312	1.423	4.539	4.173
1 5/16	1.3125	18.263	58.26	53.55	1.997	6.370	5.857	1.569	5.003	4.600
1 3/8	1.3750	19.133	61.04	56.10	2.192	6.692	6.428	1.722	5.491	5.049
1 7/16	1.4375	20.002	63.81	58.65	2.396	7.644	7.026	1.882	6.002	5.518
1 1/2	1.5000	20.872	66.58	61.20	2.609	8.322	7.650	2.049	6.536	6.008
1 9/16	1.5625	21.741	69.35	63.75	2.831	9.030	8.301	2.223	7.091	6.520
1 5/8	1.6250	22.611	72.13	66.30	3.062	9.768	8.978	2.405	7.672	7.051
1 11/16	1.6875	23.481	74.90	68.85	3.302	10.53	9.682	2.593	8.271	7.604
1 3/4	1.7500	24.350	77.67	71.40	3.550	11.32	10.41	2.789	8.896	8.178
1 13/16	1.8125	25.250	80.54	73.95	3.810	12.15	11.17	2.992	9.544	8.773
1 7/8	1.8750	26.090	83.22	76.50	4.075	13.00	11.95	3.202	10.21	9.388
1 15/16	1.9375	26.960	86.00	79.05	4.352	13.88	12.76	3.417	10.90	10.02
2	2.0000	27.829	88.77	81.60	4.638	14.79	13.60	3.642	11.62	10.68

WEIGHT OF ALUMINUM, IRON, COPPER, BRASS AND LEAD BALLS

Dia. In.	Alum., Lbs.	Iron, Lbs.	Copper, Lbs.	Brass, Lbs.	Lead, Lbs.	Dia., In.	Alum. Lbs.	Iron, Lbs.	Copper Lbs.	Brass, Lbs.	Lead, Lbs.
1	.045	.136	.166	.158	.214	7	15.58	46.76	57.1	54.5	73.7
1½	.153	.46	.562	.537	.727	7½	19.17	57.52	70.0	67.11	90.0
2	.363	1.09	1.3	1.25	1.7	8	23.27	69.81	85.2	81.4	110.1
2½	.710	2.13	2.60	2.50	3.35	8½	27.91	83.73	102.3	100.0	132.3
3	1.22	3.68	4.5	4.3	5.8	9	33.10	99.4	121.3	115.9	156.7
3½	1.94	5.84	7.14	6.82	9.23	9½	38.90	116.9	143.0	136.4	184.7
4	2.90	8.72	10.7	10.2	13.8	10	45.45	136.35	166.4	159.0	215.0
4½	3.13	12.42	15.25	14.5	19.6	10½	52.60	157.84	193.0	184.0	250.0
5	5.68	17.04	20.8	19.9	26.9	11	60.49	181.48	221.8	211.8	286.7
5½	7.56	22.68	27.74	26.47	36.0	11½	69.12	207.37	253.5	242.0	327.7
6	9.81	29.45	35.9	34.3	46.4	12	78.54	235.62	288.1	275.0	372.[illegible]
6½	12.48	37.44	45.76	43.67	59.13						

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SPECIFICATIONS FOR CYLINDER CASTINGS (ALCO)

DOMESTIC IRON CASTINGS

		Per Cent.
Silicon		1.25 to 1.60
Sulphur	less than	0.11
Phosphorus		0.50 to 0.80
Manganese		0.50 to 0.80
Combined carbon	over	0.40
Graphitic carbon	under	3.00

IMPORTED CYLINDER CASTINGS

		Per Cent.
Silicon		2.50 to 3.00
Sulphur	under	0.10
Phosphorus		1.50 to 1.80
Manganese		0.30 to 0.50
Combined carbon	over	0.50
Graphitic carbon	under	3.00

RESULTS OF TESTS OF PARSONS' MANGANESE BRONZE (CONDUCTED BY R. W. HUNT & CO.)

TENSION TESTS

Kind of Metal	Rolled		Cast	
Length, test section	2.00	2.00	2.00	2.00
Original diameter	.499	.50	.505	.505
Original area	.1956	.1963	.200	.200
Reduced diameter	.387	.372	.390	.395
Reduced area	.1176	.1087	.1194	.1225
Elongation in 2 in	.58	.70	.72	69
Elastic limit, lbs	9,740	9,900	9,230	8,950
Maximum load, lbs	13,970	13,970	17,600	16,950
Elastic limit, lbs. per sq. in	49,790	50,430	46,150	43,250
Maximum load	71,420	71,160	78,000	74,750
Reduction of area, per cent	39.8	44.6	40.3	38.7
Elongation, per cent	29	35	36	34.5
Fracture	½ Cup silky and granular	½ Cup silky and granular	½ Cup silky and granular	½ Cup silky and granular

COMPRESSION TESTS

Kind of Metal	Rolled	
Length of test piece	2.00	2.00
Diameter of test piece	1.03	1.02
Area of test piece	.790	.7886
Total compression	.584	.629
Approximate elastic limit	52,500	52,500
Maximum load, lbs	113,500	116,300
Approximate elastic limit, lbs. per sq. in	66,460	66,570
Maximum load, lbs. per sq. in	143,770	147,500
Failed by	Shear angle with vertical 36 deg.	Shear angle with vertical 33 deg.
Fracture	Silky	Silky

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PROPERTIES OF CAST ALUMINUM

The tensile strength of aluminum varies with the thickness of the castings, about as follows:

Thickness in Inches	Relative Tensile Strength in Pounds per Square Inch
0.10	108
0.20	100
0.30	98
0.40	94
0.50	90

The specific gravity of aluminum increases as the walls of castings are made thinner approximately as follows:

Thickness in Inches	Specific Gravity Corresponding
1 (square)	2.964
3–4	3.004
5–8	3.002
9–16	3.004
1–2	3.012
3–8	3.024
1–4	3.007
1–8	3.007

Shrinkage in aluminum castings is about 17.64th inch per foot. The effect of heat on tensile strength and expansion of pure aluminum is shown in the following table:

Temperature, Fahrenheit	Tensile Strength, Tons per Square Inch	Expansion in Volume
58°	11.7	.000884
212°	9.5	.006120
302°	8.1	.009180
392°	6.3	.012240
482°	4.8	.015300
572°	3 6	.018360
752°	2.4	.024480
842°	1.5	.027540
860°	1.0	.028152

MATERIALS FOR MOTOR POPPET VALVES

The materials of construction most commonly used include the following: Special high carbon steel, high nickel alloy steel, nickel steel heads on carbon steel stems, cast gray iron heads on carbon steel stems.

HIGH CARBON STEEL FOR VALVES

Chemical Composition

Carbon	Silicon	Sulphur	Phosphorus	Manganese
115	10	0.015	0.012	0.40

PHYSICAL PROPERTIES

Tensile Strength in Pounds per Square Inch	Elastic Limit in Pounds per Square Inch	Elongation per cent. in 2 Inches	Reduction of Area in per cent.
149,800	50,000	5	16

HIGH NICKEL ALLOY STEEL FOR VALVES

Chemical Composition

Nickel	Carbon	Silicon	Sulphur	Phosphorus	Manganese
35	0.10	0.15	0.012	0.012	0.35

PHYSICAL PROPERTIES

Tensile Strength in Pounds per Square Inch	Elastic Limit in Pounds per Square Inch	Elongation per cent. in 2 Inches	Reduction of Area in per cent.
85,000	55,000	25	50

When the alloy steel is used for the heads and the soft steel for the stems union can be effected by the autogenous or electric welding processes.

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STRENGTH OF AUTOMOBILE MATERIALS

	Modulus of Rigidity	Elastic Limit	Tensile Strength
Aluminum alloys	8 to 11 million	10 M to 15 M	20 M to 30 M
Phosphor bronze	12 to 14 "	20,000	30,000
Manganese bronze	15 "	35,000	50,000
Aluminum bronze	15 "	50,000	75,000
Wrought iron	28 "	30,000	40,000
Mild open hearth steel	28 "	40,000	60,000
Tool steel	29 "	80,000	110,000
Nickel steel	28 "	80,000	110,000
Nickel chrome steel	30 "	160,000	180,000
Vanadium steel treated	30 "	220,000	228,000

All of the above materials stand well under dynamic stress with the exception of the tool steel, which should not be used for this purpose.

TEST OF HIGH QUALITY NICKEL CHROME STEEL (KRUPP)

DIMENSIONS OF TEST BARS, 5.91 INS. LONG AND 0.59 INS. DIAMETER

	Normal	Slightly Hardened	Greater Degree of Hardness
Elastic limit, pounds per square inch	86,909	148,072	193,589
Tensile strength, pounds per square inch	111,943	155,326	221,325
Elongation, per cent	14.5	9.1	7.7
Contraction, per cent	64.0	55.6	46.2

Foregoing tests assume correct heat treatment.

MELTING POINTS OF METALS

Cast iron	2210 deg. Fahr
Wrought iron	2912 " "
Steel	2500 " "
Copper	2160 " "
Brass	1900 " "
Aluminum (pure)	1112 " "
Lead	608 " "
Tin	446 " "

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MALLEABLE IRON TESTS

Results of Test of Sample Malleable Iron Bar made for the Ohio Malleable Iron Company, Columbus, O.

Test No.	Test made by	Elastic Limit Lbs. per sq. in.	Tensile Strength Lbs. per sq. in.	Elongation per cent.	Reduction of Area per cent.
58491	The Detroit Testing Laboratory.	37195	53283	15.62	21.38
32504	Pittsburg Testing Laboratory	34750	54340	18.00	21.1
	Robert W. Hunt & Co.....	41195	52940	17.00	25.63

SPECIFICATIONS FOR CAST IRON PARTS (GERMAN).

(*Translated from "Metall Technick"*)

Specifications for cast-iron parts have only of relatively recent date been subjected to regulations of recognized value, and this has been one of the reasons for discrediting castings as parts in automobile construction, their strength being difficult to determine in advance. The reason why practice and science have refrained from formulating basic rules for deciding the strength and properties of cast-iron parts, even though foundry science has progressed by leaps and bounds, is to be sought in the fact that the unit strength of a casting, even in the case of comparison between materials derived from the same ladle, depends largely upon the dimensions of the piece and the more or less rapid cooling to which it has been subjected. The same difference arises with regard to a single cast piece, according to the direction and location of the stress. The strength along one cross-section varies from the strength through another section, and the difference is not pro rata with the dimensions. Slow cooling, as where the diameter is greatest, produces a coarser structure and also causes carbon to be precipitated as graphite between the walls of adjacent crystals, greatly reducing strength. Flexion tests made by O. Leyde with bars of square section of different dimensions and all cast in one piece with a heavier bar uniting them across one end showed that the softest iron developed the most pronounced differences in unit strength, in favor of the bars of small section. A bar 10 by 10 millimeters in section endured a stress of 47 kilograms per square millimeter, while a bar of 150 by 150 millimeters cross-section endured only 18 kilograms per square millimeter. In three series of tests the materials differed mainly in silicon, this metalloid running from 2.1 per cent. in the hardest to 1.5 per cent. and 1.2 per cent. in the softer grades. The composition otherwise was carbon 3, phosphorus 0.6, manganese 0.7 and sulphur 0.12. Similar results were reached in tests by Sulzer Brothers of Winterthur with bars from 5 to 50 millimeters in diameter, giving a strength decreasing from 63 kilograms for a bar of 5 millimeters diameter to 27 kilograms for the largest size. The Society of German Iron Foundries has now created regulations for cast-iron tests in which the principal source of error in previous rules—the use of only a single dimension of bar—is eliminated. The new regulations distinguish between: A, machine castings of (1) medium, (2) high and (3) very high strength; B, architectural and construction castings and C, pipe castings, comprising (1) gas and water pipe and (2) steam pipe. Each subdivision is further divided according to dimensions of the casting in three classes: (1) Pieces with walls up to 15 millimeters thick; (2) between 15 and 25 millimeters, and (3) average wall thickness of more than 25 millimeters. Further regulations extend to shapes, properties of the material and method of producing test bars. In addition to flexion tests here is provided test by internal hydraulic pressure for tubular castings. The testing work which was called into action by these regulations at the various foundries has created a demand for a special machine for facilitating the measurements, and one such has been produced by the Düsseldorfer Machine Company, Inc., and is provided with automatic stress-measuring instrument and recording manometer giving direct reading in kilograms.

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EFFICIENCY TEST OF AUTOMOBILE RADIATOR (McCORD)

Height, 28.5"; Width, 25"; Thickness, 3.25"; Weight, 60 pounds. Made up of 144 Vertical Water Tubes ¼" Diameter

Time in Mins.	R.P.M. of Motor	Pounds on Scale	Temperature F.				
			Water		Air		
			To Radiator	From Radiator	To Fan	From Fan	In Room
00	1000	20.00	160.00	152.00	90.25	95	86.0
05	1000	20.00	181.00	172.00	91.75	99	87.8
10	1000	19.75	189.00	180.00	91.75	100	88.5
15	1000	20.00	193.00	184.00	91.75	102	89.0
20	1000	19.75	195.00	185.00	91.75	109	89.6
25	1000	20.00	197.00	187.00	92.50	104	90.3
30	1000	20.00	198.00	188.00	92.50	104	90.3
35	1000	20.00	197.00	187.00	92.50	103	89.9
40	1000	20.00	197.00	187.00	95.50	103	90.1
45	1000	20.00	197.25	187.25	92.50	102	90.1
50	1000	20.00	197.00	187.25	92.50	102	89.6
55	1000	20.00	197.00	187.25	93.25	104	89.6
60	1000	20.00	197.00	187.00	91.75	102	90.5
65	1000	30.00	207.00	196.00	94.00	105	91.0
70	1000	30.00	211.00	201.50	96.25	107	92.5
71	1000	30.00	212.00	202.00	96.25	107	92.8

Note.—144 pounds of jacket water per minute.

The test as here given was made by an automobile builder. The table shows, among other points of interest, that it took 25 minutes before the water reached a constant temperature, after which the radiator abstracted 1,431.4 B.T.U. of heat from the jacket water, with a difference in the water between inlet and outlet of 9.94 degrees Fahrenheit, working between the limits of 197 and 187 degrees Fahrenheit. The amount of water circulated was (as given in the table) 144 pounds. Since the temperature did not reach the maximum allowable in practice (the boiling point of water) it is a fair inference that the capacity of this radiator can be taken as about equal to 1,500 B.T.U. (British thermal units of heat) under the conditions of this test, considering round numbers.

APPROXIMATE WOOD WHEEL DIAMETERS FOR VARIOUS SIZES AND TYPES OF RIMS

Size Tire	Clincher and Universal	Firestone Demountable	Fisk Bolted On	Fisk Demountable	Continental Demountable	Continental Demountable Metric Sizes
30 × 3½	22 11/16	21 11/16	21 13/16	19 3/16	22	.....
32 × 3½	24 11/16	23 11/16	23 13/16	21 3/16	24	810 × 90 – 23 3/16
34 × 3½	26 11/16	25 11/16	25 13/16	23 3/16	26	870 × 90 – 25⅝
36 × 3½	28 11/16	27 11/16	27 13/16	.....	28	910 × 90 – 27 3/16
30 × 4	21 11/16	20 11/16	20⅝	.....	21	.....
32 × 4	23 11/16	22 11/16	22⅝	20	23	.....
34 × 4	25 11/16	24 11/16	24⅝	22	25	875 × 105 – 25⅝
36 × 4	27 11/16	26 11/16	26⅝	24	27	915 × 105 – 27 3/16
32 × 4½	22 21/32	21 21/32	21½	.....	.....	820 × 120 – 21 17/64
34 × 4½	24 21/32	23 21/32	23½	20 13/16	23 59/64	880 × 120 – 23 47/64
36 × 4½	26 21/32	25 21/32	25½	22 13/16	25 59/64	920 × 120 – 25 3/16
34 × 5	23 21/32	22 21/32	.....	19 7/16	22 59/64	.....
36 × 5	25 21/32	24 21/32	.....	21 13/16	24 59/64	.....
36 × 5½	24 21/32	23 21/32	.....	.....	.....	935 × 135 – 24 3/64
37 × 5½	25 21/32	24 21/32	.....	.....	24 3/64	.....

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AUTOMOBILE WHEEL DATA

The following information is approximately correct, but the weights, etc., may vary according to the height of wheels, etc.:

WEIGHT OF WHEELS PER SET OF FOUR

Weight of wheels and hubs without rims or channels, size of spoke 7/8 to 1" or 1 1/8", about	50	pounds
" same size with steel rims for 2 1/2" or 3" tire	110	"
" 1" or 1 1/8" spokes	65	"
" including rims for 3" or 3 1/2" tires	145	"
" 1 1/4" or 1 3/8" spokes	100	"
" including rims for 3 1/2" or 4" tires	210	"
" 1 3/8" or 1 1/2" spokes	112	"
" including rims for 4" or 4 1/2" tire	250	"

Axles are not included in above.

METRIC TIRES AND THEIR AMERICAN EQUIVALENTS

Metric Sizes	Approximate Size in Inches
650 x 65	26 x 2 1/2
700 x 65	28 x 2 1/2
750 x 65	30 x 2 1/2
800 x 65	32 x 2 1/2
830 x 65	33 x 2 1/2
860 x 65	34 x 2 1/2
700 x 85	28 x 3 1/4
750 x 85	30 x 3 1/4
800 x 85	32 x 3 1/4
860 x 85	34 x 3 1/4
760 x 90	30 x 3 1/2
810 x 90	32 x 3 1/2
840 x 90	32 x 3 1/2
870 x 90	34 x 3 1/2
910 x 90	36 x 3 1/2
960 x 90	38 x 3 1/2
1010 x 90	40 x 3 1/2
815 x 105	32 x 4
875 x 105	34 x 4
915 x 105	36 x 4
820 x 120	32 x 4 1/2–5
850 x 120	33 x 4 1/2–5
880 x 120	34 x 4 1/2–5
920 x 120	36 x 4 1/2–5
1020 x 120	40 x 4 1/2–5
1080 x 120	42 x 4 1/2–5

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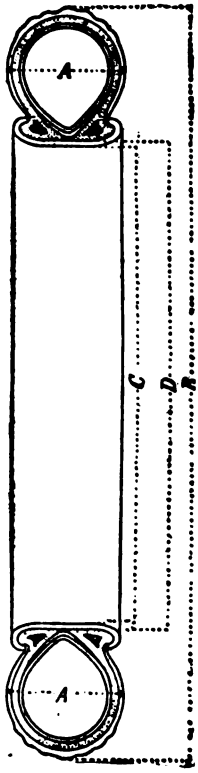
CLINCHER TIRE AND RIM DIMENSIONS



A	B	C	D
Inches	Inches	Inches	Inches
2 ½	26	20 ¾	21
3	26	19 ¾	20
2 ½ and 3	28	21 ¾	22
2 ½ and 3	30	23 ¾	24
3	32	25 ¾	26
3	34	27 ¾	28
3	36	29 ¾	30
3 ½	28	20 11/16	21
3 ½	30	22 11/16	23
3 ½	32	24 11/16	25
3 ½	34	26 11/16	27
3 ½	36	28 11/16	29
4	30	21 11/16	22
4	32	23 11/16	24
4	34	25 11/16	26
4	36	27 11/16	28
4 ½	32	22 11/16	23
4 ½	34	24 11/16	25
4 ½	36	26 11/16	27

PROPORTIONS BETWEEN AXLE LOADS AND TIRE SIZES ADOPTED BY AMERICAN TIRE MAKERS

2 ½-inch tires, all diameters	225 pounds per wheel
3 inch tires, all diameters	350 " " "
3 ½ x 28-inch tires	400 " " "
3 ½ x 30-inch tires	450 " " "
3 ½ x 32-inch tires	555 " " "
3 ½ x 34-inch tires	600 " " "
3 ½ x 36-inch tires	600 " " "
4 x 30-inch tires	550 " " "
4 x 32-inch tires	650 " " "
4 x 34-inch tires	700 " " "
4 x 36-inch tires	750 " " "
4 ½ x 32-inch tires	700 " " "
4 ½ x 34-inch tires	800 " " "
4 ½ x 36-inch tires	900 " " "

For weights in excess of 1,000 pounds per wheel, 5-inch tires and over are recommended. Weights given apply to car without passengers.

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AIR PRESSURES FOR INFLATING PNEUMATIC TIRES RECOMMENDED BY LEADING MAKERS

Diameter of Tire, Inches	Maximum Weight on Wheel, lbs.	Air Pressure in Tire, lbs. per Square Inch
2½	225	50
3	350	60
3½	600	70
4	750	80
4½	1,000	90
5	1,000	90

INCREASE IN AIR PRESSURES CAUSED BY DRIVING

The figures given by tire manufacturers as the most suitable for initial inflation generally take into account the increase in temperature and pressure created by prolonged running. It, however, is useful to know what this increase is. The figures given in the following table are given by a French authority and are averages computed on tires from 3 to 4½ inches diameter under usual touring car weight and speed conditions. For larger tires the increase is greater on account of the greater rigidity of the cover walls, resulting in greater internal strains in the fabric at the points of bending.

Initial Pressure in Tire, Cold	Working Pressure in Tire, Warm	Increase Resulting from Work
Lbs. per Sq. In.	*Lbs. per Sq. In.*	*Lbs. per Sq. In.*
71.116	88.183	17.067
85.339	105.750	20.411
99.562	123.546	23.984
113.785	141.920	28.135
128.008	158.588	30.580
142.232	176.368	34.136

CAUSES OF PNEUMATIC TIRE TROUBLES

The following tables were prepared by one of the largest tire makers as a result of investigations in several thousand repair jobs:

SHOES

17.3 per cent. in consequence of insufficient inflation.
3.5 per cent. in consequence of rusty and dented rims.
1.5 per cent. in consequence of cutting off of cover pad through inadequate fastening of butterfly screw, whereby the cover could shift on the rim.
.8 per cent. in consequence of sudden braking, which scoured through tire at one place
.2 per cent. in consequence of contact with oil or other fatty substances, which are known to decompose rubber.
29.4 per cent. in consequence of perforation by nails, stones and pieces of iron.
4.3 per cent. in consequence of light damages and cuts on the threads, easily repaired.
4.9 per cent. in consequence of considerable outer damages, whereby the upper canvas layers were destroyed.
37.1 per cent. in consequence of normal wear and tear.

100.0

TUBES

13.0 per cent. nipped in mounting.
7.2 per cent. places scoured through in consequence of defective mounting or the presence of sand and small stones in tire.
9.5 per cent. through defective mounting.
6.8 per cent. through riding on deflated tubes.
5.8 per cent. damages through defective and wrong cover holders.
10.0 per cent. valve defects through wrong manipulation of valve.
43.7 per cent. normal wear and tear.

100.0

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MILEAGE OF PNEUMATIC TIRES

The accompanying tabulated statement of tire mileage is the result of an extensive investigation made by W. A. Weygandt of Akron, Ohio. The table covers 144¾ sets of tires of ten leading makes, in use in every part of the United States on thirty different makes of touring cars. The general average of mileage per set is 5199¼. (The usual tire guarantee is 3500 miles.) The average of casings replaced for any and all causes is three-fourths of one to each set of tires used. The average life of an inner tube is found to be 3543.3 miles.

TIRE MILEAGE RESULTS OBTAINED BY AUTOMOBILE OWNERS

Make of tire	A	B	C	D	E	F	G	H	I	J
Sets reported	41¼	43	13	12¼	8	7	6	7	4	3
Grand total, mileage	256,539	239,975	70,300	65,798	34,100	21,594	20,236	20,200	14,000	8,450
Grand average, mileage	6,221	5,580	5,361	5,371	4,262	3,084	3,372	2,825	3,500	2,816
Grand total, time in use, months	339½	404½	122½	82	93½	61½	37	46½	26	12½
Grand total, extra casings used	23	34	6	6	9	6	9	3	5	1
Grand total, extra tubes used	54	73	24	10	9	17	7	9	5	4
Average period of use, months	8¼	9.3	9⅖	6.7	11.7	8⅚	6⅙	6⅜	6½	4⅙
Average monthly mileage	755.9	593¼	573⅚	802⅜	364.7	351.1	546.9	436½	538⅜	676

AUTOMOBILE SPRING CONSTRUCTION

A formula for determining the safe loading of semi-elliptic leaf springs for automobiles is as follows:

Let,

B = Width of plate in inches.
T = Thickness of plates in 1-16 inches.
N = Number of plates used.
S = Span of spring in inches.
C = A constant = 11.3.

Then,

$$\text{Safe load in tons} = \frac{B\,T^2\,N}{C\,S}$$

To find the amount of deflection in inches per ton of load: Let,

D = Deflection in inches per ton of load.
L = Span of spring in inches.
C = Constant—40,000.
B = Width of plates in inches.

Then,

$$D = \frac{L^3}{CBT^3N}$$

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FORMULA FOR DETERMINING DIAMETERS OF SPROCKETS FOR ROLLER CHAINS (WHITNEY MFG. CO.)

N = Number of teeth in sprocket.
P = Pitch of chain.
D = Diameter of roller.

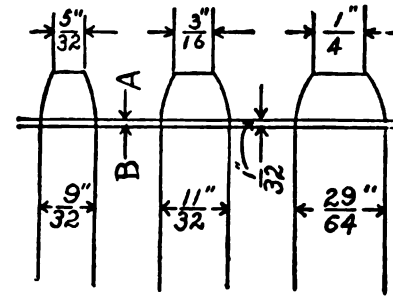
$$a = \frac{180°}{N}$$

$$\text{Pitch Diameter} = \frac{P}{\text{sine } a}$$

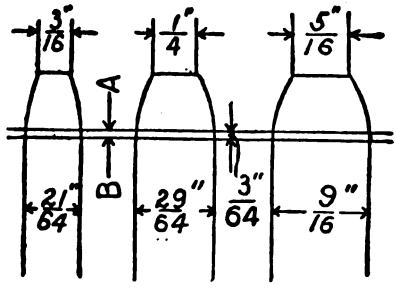
Outside Diameter = Pitch Diameter + D.
Bottom Diameter = Pitch Diameter − D.

The accompanying drawings show width and shape of sprocket blanks as they should be machined before cutting the teeth to fit (Whitney) chains.

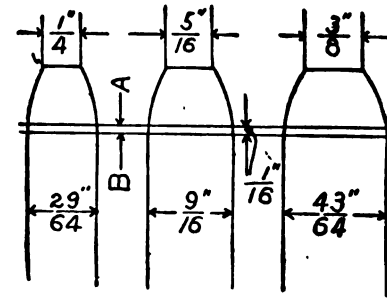
The line "A" indicates pitch line and the line "B" below the pitch line indicates the point at which the clearance curves should start.



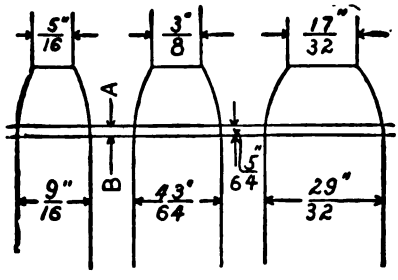
	Pitch of Chain	
¾"	¾"	⅝"
	Diameter of Roll	
15/32"	15/32"	16/32
	Width of Roll	
5/16"	⅜"	½"



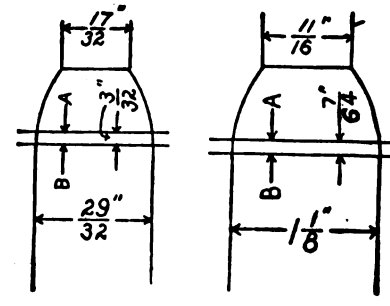
	Pitch of Chain	
1"	1"	1"
	Diameter of Roll	
⅝"	⅝"	⅝"
	Width of Roll	
⅜"	½"	⅝"



	Pitch of Chain	
1¼"	1¼"	1¼"
	Diameter of Roll	
¾"	¾"	¾"
	Width of Roll	
½"	⅝"	¾"



	Pitch of Chain	
1½"	1½"	1½"
	Diameter of Roll	
⅞"	⅞"	⅞"
	Width of Roll	
⅝"	¾"	1"



	Pitch of Chain	
1¾"		2"
	Diameter of Roll	
1"		1⅛"
	Width of Roll	
1"		1⅛"

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Notice to Customers Who Desire to Use "Whitney" Chains of the Silent Type.

Copy of circular issued May 14, 1913.

Since we commenced to market chains of the Silent type, we have made special effort to impress upon our customers the necessity for providing proper conditions for both chains and sprockets. We have pointed out that sprocket blanks must be turned to the right shape and that the teeth must be correctly cut. Sprockets should not have less than 15 teeth, should be larger if possible, and should be kept accurately in line. We have also urged on our customers the importance of selecting chains wide enough and large enough for their purpose, and we have asked that in all cases customers make a thorough and exhaustive test before ordering in quantities to make sure that all conditions have been properly provided for. As a means to this end, we have requested that the sprocket teeth be cut either by the customer or by The Whitney Mfg. Co., and not by some third party. In spite of these warnings, we now find cases where our chains may fail to give complete satisfaction because some customers are already using them on improper sprockets, or have adopted chains too small in pitch or too narrow for their conditions.

We therefore desire to state that customers who do not follow our suggestion, but on the contrary secure sprockets wherever they please and possibly where they can secure the lowest price, are liable to obtain incorrect sprockets so that at any moment we may feel compelled in such cases to discontinue shipments of chain, or insist that sprockets be sent to us for inspection at the customers' expense, before furnishing chain.

We will endeavor to force customers to use our chains on correct sprockets and to use chains of a sufficient size for the purpose even if we get certain customers into temporary difficulty. The ultimate result, however, we believe will be beneficial to all.

If a customer will explain the conditions for which our Silent chain is desired, we will be pleased to recommend a size of chain for trial, but, as stated above, we advise that chains shall not be purchased in quantity until a severe test has been made and the results found satisfactory.

In the early days of the Bicycle industry and when Roller chains were first used for the main drive on automobiles, certain customers used our chains on incorrect sprockets and we shielded them in every way possible, letting the chain take the blame for unsatisfactory results. With the Silent chain we will positively not follow this plan, and if customers adopt chains without making proper tests and use them on poor sprockets, or under unfavorable conditions, they must take the consequences, for we certainly shall accept no responsibility in the matter, tho' such customers would of course have our sympathy and we would do our best to render assistance.

We must positively maintain our position as outlined above as we do not intend that our chains shall be unjustly condemned if we can help it.

THE WHITNEY MFG. CO., Hartford, Conn.

Manufacturers of High Grade Driving Chains, Keys and Cutters for The Woodruff System of Keying, Hand Feed Milling Machines.

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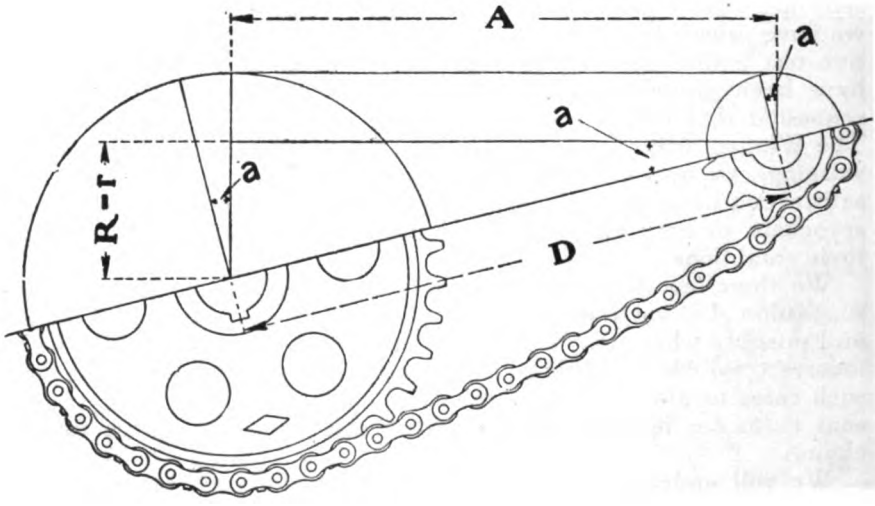
FORMULA FOR CALCULATING LENGTH OF CHAIN

(DIAMOND CHAIN AND MFG. CO.)



(All Dimensions in Inches)

D = Distance between centers.
A = Distance between limits of contact.
R = Pitch radius of large sprocket.
r = Pitch radius of small sprocket.
N = No. of teeth on large sprocket.
n = No. of teeth on small sprocket.
P = Pitch of chain and sprockets.
$180° + 2a$ = Angle of contact—large sprocket
$180° - 2a$ = Angle of contact—small sprocket.

$$\sin a = \frac{R - r}{D}$$

$$A = D \cos a$$

Length of chain $= L$

$$L = \frac{(90 + a)\,N P}{180} + \frac{(90 - a)\,n P}{180} + 2 D \cos a$$

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ANTI-FREEZING SOLUTIONS FOR MOTOR COOLING SYSTEMS

Saline solutions and mixtures of alcohol and water are the most commonly used to prevent freezing up of the cooling system in water-cooled motor vehicles when operated in low winter temperatures. Of the former, that in best repute is a solution of calcium chloride. Crystallized calcium chloride contains about 50 per cent. water of crystallization and dissolves in half its weight of cold water; consequently 8 pounds of calcium chloride dissolved in ½ gallon of water will make 1 gallon of saturated solution. The accompanying table (Fig. 1) shows the percentages of calcium chloride and corresponding specific gravity required to prevent freezing at temperature ranges from freezing point to −40 degrees Fahrenheit. In the use of this solution its thermal capacity, which is lower than water, should be borne in mind.

Taking the specific heat of water as 1.000, the specific heat of a 20 per cent. solution of calcium chloride is 0.834.

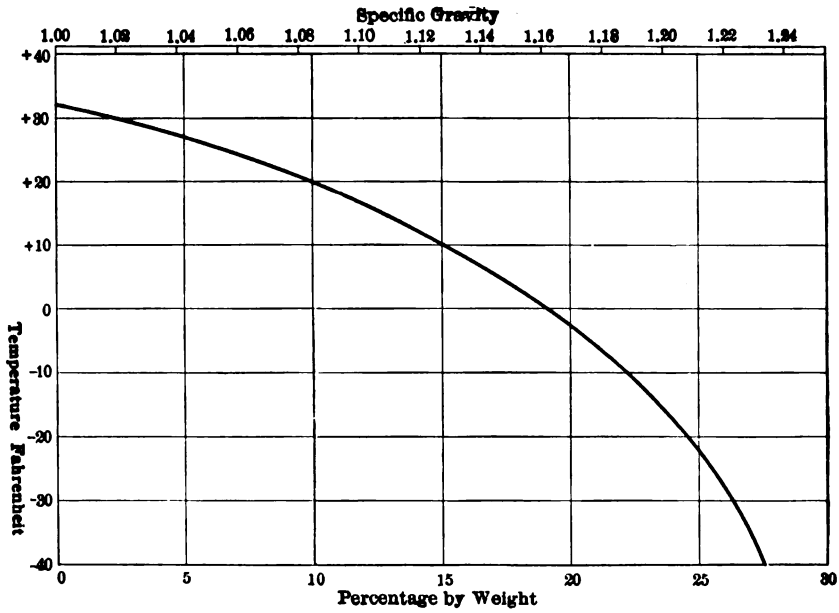

FIG. 1.—Diagram of Freezing Points of Various Solutions of Calcium Chloride in Water.

Mixtures of alcohol and water may be made with either wood alcohol or denatured alcohol. The latter is simply ordinary spirits distilled from grain with an admixture of certain substances that render it unfit for drinking and which may be disregarded in its consideration as a cooling medium. In the accompanying table (Fig. 2) the respective anti-freezing values for wood alcohol and denatured alcohol are given in terms of percentages of the liquid used in the motor-cooling system. These values cover a temperature range from freezing point to −50 degrees Fahrenheit. The specific gravity readings are also included. It will be noted that wood alcohol gives the best results, although objection is frequently made to its use on account of its unpleasant odor.

(Continued on page 658)

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In the use of this mixture the constant tendency of the alcohol to evaporate out and the consequent raising of the freezing point of the mixture should be borne in mind. At any time after the filling of the cooling system with the mixture, a sample can be drawn off and its specific gravity determined by the use of the hydrometer. If the reading is too high, sufficient alcohol can be added to make up for loss by evaporation, taking care, of course, that the amount of water in the system has not been diminished by steaming.

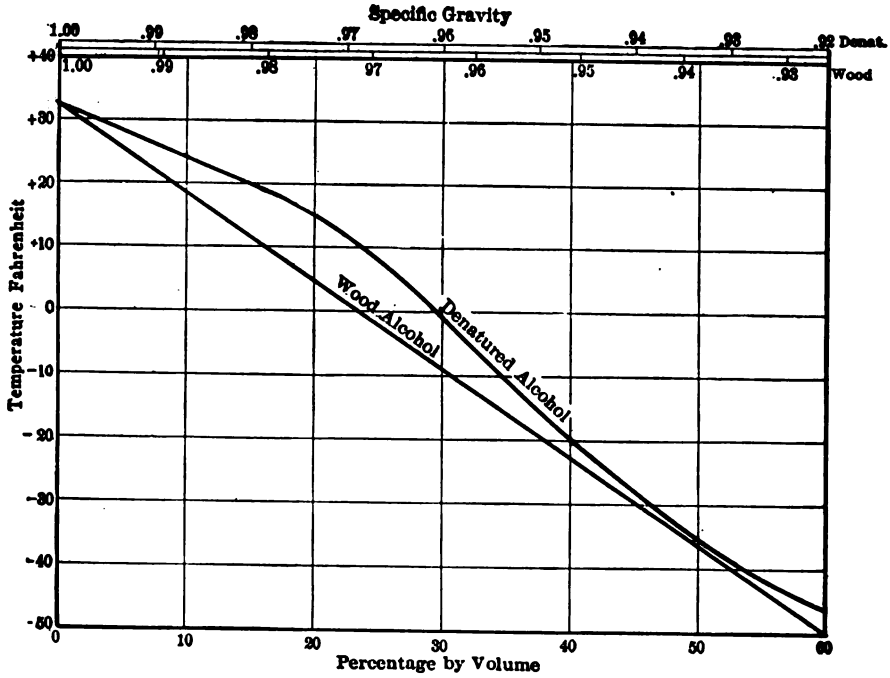

FIG. 2.—Diagram Showing Freezing Temperatures of Mixtures of Alcohol and Water.

STEEL BALLS. "STANDARD" SIZE AND WEIGHTS

Size	Decimal	No. per Pound	Size	Decimal	Ounces
1/16"	.0625	27,904	13/16"	.8125	1 1/2
3/32"	.0937	8,264	7/8"	.8750	1 3/4
1/8"	.1250	3,400	15/16"	.9375	2
5/32"	.1563	1,770	1"	1.000	2 1/2
3/16"	.1875	1,030	1 1/8"	1.125	3 1/2
7/32"	.2188	640	1 1/4"	1.250	4 3/4
1/4"	.2500	430	1 3/8"	1.375	6 1/4
9/32"	.2613	300	1 1/2"	1.500	8
5/16"	.3125	220	1 5/8"	1.625	10
11/32"	.2438	165	1 3/4"	1.750	13
3/8"	.3750	125	1 7/8"	1.875	15 1/2
7/16"	.4375	80	2"	2.000	19 1/4
1/2"	.5000	52	2 1/4"	2.250	27
9/16"	.5625	36	2 1/2"	2.500	37
5/8"	.6250	28	2 3/4"	2.750	49
11/16"	.6875	21	3"	3.000	64
3/4"	.7500	16	3 1/4"	3.250	81 1/2
			3 1/2"	3.500	101 1/2
			3 3/4"	3.750	125
			4"	4.000	152

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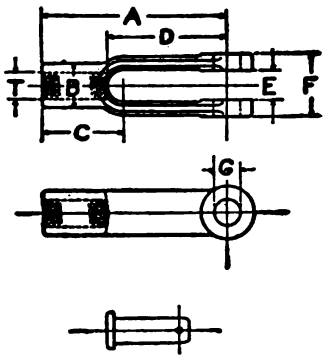
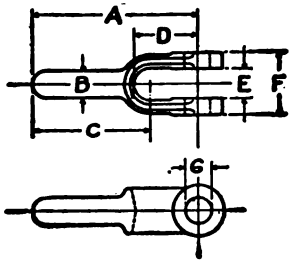
S. A. E. YOKE AND EYE ROD END STANDARD.

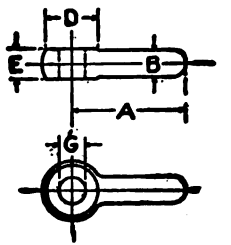
ADJUSTABLE YOKE ENDS



PLAIN YOKE ENDS



ROD ENDS



A	B	C	D	E	F	G	T
1 9/16	5/16	11/16	1	3/16	7/16	3/16	3/16 32 U. S.
2	7/16	7/8	1 1/4	9/32	5/8	1/4	1/4 28 A.L.A.M.
2 1/4	1/2	1	1 7/16	11/32	3/4	5/16	5/16 24 A.L.A.M.
2 1/2	5/8	1 1/8	1 5/8	7/16	7/8	3/8	3/8 24 A.L.A.M.
2 7/8	23/32	1 1/4	1 7/8	1/2	1	7/16	7/16 20 A.L.A.M.
3	13/16	1 7/16	1 7/8	9/16	1 1/8	1/2	1/2 20 A.L.A.M.

A	B	C	D	E	F	G
1 1/4	3/16	7/8	7/16	3/16	7/16	5/16
1 3/4	1/4	1 1/4	5/8	9/32	5/8	1/4
2	5/16	1 3/8	3/4	11/32	3/4	5/16
2 1/8	3/8	1 7/16	27/32	7/16	7/8	3/8
2 1/4	7/16	1 1/2	1	1/2	1	7/16
2 1/2	1/2	1 5/8	1 1/8	9/16	1 1/8	1/2

A	B	D	E	G
1 1/8	3/16	3/8	5/16	3/16
1 1/4	1/4	1/2	9/32	1/4
1 3/8	5/16	19/32	11/32	5/16
1 1/2	3/8	11/16	7/16	3/8
1 1/2	7/16	13/16	1/2	7/16
1 3/4	1/2	15/16	9/16	1/2

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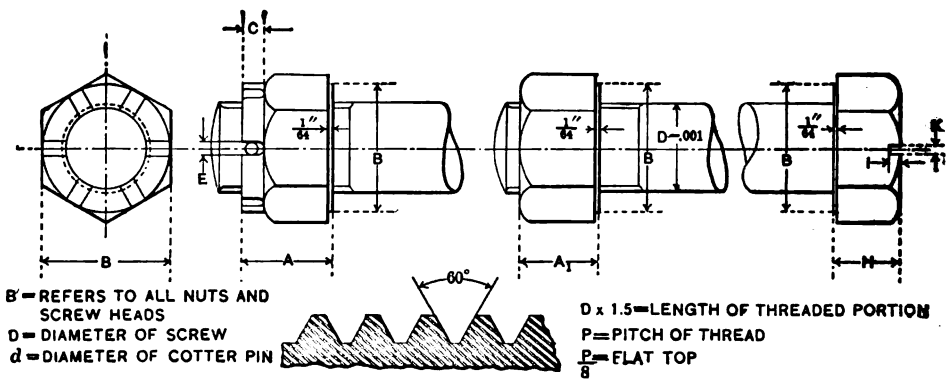
SOCIETY OF AUTOMOBILE ENGINEERS' STANDARD FOR HEXAGON HEAD SCREWS, CASTLE AND PLAIN NUTS.

It is assumed that where screws are to be used in soft material, such as cast-iron, brass, bronze or aluminum, the existing United States standard pitches will be used.

DIMENSIONS



D	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
P	28	24	24	20	20	18	18	16	16	14	14	12	12	12	12
A	9/32	21/64	13/32	29/64	9/16	39/64	23/32	49/64	13/16	29/32	1	1 5/32	1 1/4	1 13/32	1 1/2
A1	7/32	17/64	21/64	3/8	7/16	31/64	35/64	19/32	21/32	49/64	7/8	63/64	1 3/32	1 13/64	1 5/16
B	7/16	1/2	9/16	5/8	3/4	7/8	15/16	1	1 1/16	1 1/4	1 7/16	1 5/8	1 13/16	2	2 3/16
C	3/32	3/32	1/8	1/8	3/16	3/16	1/4	1/4	1/4	1/4	1/4	5/16	5/16	3/8	3/8
E	5/64	5/64	1/8	1/8	1/8	5/32	5/32	5/32	5/32	5/32	5/32	7/32	7/32	1/4	1/4
H	3/16	15/64	9/32	21/64	3/8	27/64	15/32	33/64	9/16	21/32	3/4	15/16	15/16	1 1/32	1 1/8
I	3/32	7/64	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	7/32	7/32	1/4	1/4
K	1/16	1/16	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	3/32	5/32	5/32	3/16	3/16
d	1/16	1/16	3/32	3/32	3/32	1/8	1/8	1/8	1/8	1/8	1/8	11/64	11/64	13/64	13/64

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WE have provided ourselves with a Supply of Special Material, also Taps and Gauges, and are prepared to furnish

Hexagon Head Screws, Nuts, etc.

which we guarantee fully up to the Specifications of the S. A. E.

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INTERNATIONAL (METRIC SYSTEM) STANDARD 60° THREAD

Diameter of Screw	Pitch	Diameter at Root of Thread	Width of Flat at Top and Bottom of Thread
Millimetres	*Millimetres*	*Millimetres*	*Millimetres*
3	.5	2.35	.06
4	.75	3.03	.09
5	.75	4.03	.09
6	1.0	4.70	.13
7	1.0	5.70	.13
8	1.0	6.70	.13
8	1.25	6.38	.16
9	1.0	7.70	.13
9	1.25	7.38	.16
10	1.5	8.05	.19
11	1.5	9.05	.19
12	1.5	10.05	.19
12	1.75	9.73	.22
14	2.0	11.40	.25
16	2.0	13.40	.25
18	2.5	14.75	.31
20	2.5	16.75	.31
22	2.5	18.75	.31
22	3.0	18.10	.38
24	3.0	20.10	.38
26	3.0	22.10	.38
27	3.0	23.10	.38
28	3.0	24.10	.38
30	3.5	25.45	.44
32	3.5	27.45	.44
33	3.5	28.45	.44
34	3.5	29.45	.44
36	4.0	30.80	.5
38	4.0	32.80	.5
39	4.0	33.80	.5
40	4.0	34.80	.5
42	4.5	36.15	.56
44	4.5	38.15	.56
45	4.5	39.15	.56
46	4.5	40.15	.56
48	5.0	41.51	.63
50	5.0	43.51	.62
52	5.0	45.51	.63

NOTE.—This thread is largely used by Italian constructors.

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MIDDLETOWN, CONN.

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BRAKE THAT GRIPS LINING

The Enduring Efficiency of Multibestos Brake Lining is due to a firm, close weave of the purest asbestos and brass wire. There is nothing in it which can burn and its heat resistance and coefficient of friction are of the highest.

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STANDARD WOVEN FABRIC CO.
FRAMINGHAM, MASS.

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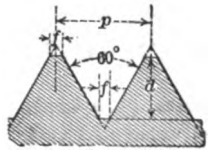
UNITED STATES 60° SCREW THREAD



Formula
$$\begin{cases} p = \text{pitch} = \dfrac{1}{\text{No. threads per inch}} \\ d = \text{depth} = p \times .6495 \\ f = \text{flat} = \dfrac{p}{8} \end{cases}$$

Diameter of Screw	Threads to Inch	Diameter at Root of Thread	Width of Flat
1/4	20	.185	.0063
5/16	18	.2403	.0069
3/8	16	.2936	.0078
7/16	14	.3447	.0089
1/2	13	.4001	.0096
9/16	12	.4542	.0104
5/8	11	.5069	.0114
3/4	10	.6201	.0125
7/8	9	.7307	.0139
1	8	.8376	.0156
1 1/8	7	.9394	.0179
1 1/4	7	1.0644	.0179
1 3/8	6	1.1585	.0208
1 1/2	6	1.2835	.0208
1 5/8	5 1/2	1.3888	.0227
1 3/4	5	1.4902	.0250
1 7/8	5	1.6152	.0250
2	4 1/2	1.7113	.0278
2 1/4	4 1/2	1.9613	.0278
2 1/2	4	2.1752	.0313
2 3/4	4	2.4252	.0313
3	3 1/2	2.6288	.0357
3 1/4	3 1/2	2.8788	.0357
3 1/2	3 1/4	3.1003	.0385
3 3/4	3	3.3170	.0417
4	3	3.5670	.0418
4 1/4	2 7/8	3.7982	.0455
4 1/2	2 3/4	4.0276	.0455
4 3/4	2 5/8	4.2551	.0476
5	2 1/2	4.4804	.0500
5 1/4	2 1/2	4.7304	.0500
5 1/2	2 3/8	4.9530	.0526
5 3/4	2 3/8	5.2030	.0526
6	2 1/4	5.4226	.0556

Standard Proportions for Machine Screws

The report of the committee on standard proportions for machine screws of the American Society of Mechanical Engineers is published in the October, 1906, proceedings of the society. The report is substantially in agreement with the recommendations adopted at the joint meeting held in New York, April 11, 1904.

The committee believes the following combined details to be essential in establishing and maintaining a standard for the diameters, threads and heads of machine screws, including, as it does, diameters, threads and limits for the taps which are to be used in connection therewith: (*a*) form of thread, (*b*) diameters, (*c*) number of threads per inch, (*d*) standard reference thread gauges, basic and for screws and taps, (*e*) working gauges for screws and taps, (*f*) limits of variation, measured in the angle of the thread, (*g*) limits of variation in external diameter, (*h*) limits of variation in the pitch of the thread screws and taps, (*k*) proportions of the heads.

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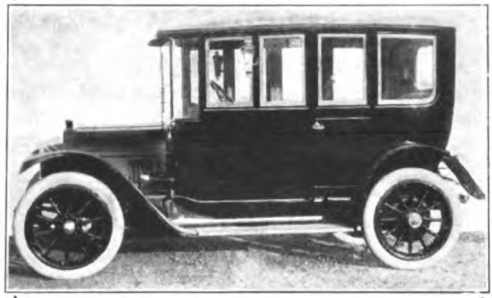

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Two No. 2 Landis Grinders, Universal
One No. 2 Morris Grinder, Universal
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DRILL SIZES FOR STANDARD THREADS

These sizes give an allowance above the bottom of thread on sizes 5/16 to 2; varying respectively as follows: for " V " Threads, .010″ to .055″; for U. S. S. and Whitworth threads .005″ to .027″.

These are found by adding to the size at bottom of thread 1/4 of the pitch for " V " threads, and 1/8 of the pitch for U. S. S. and Whitworth, the pitch being equal to 1″ ÷ No. of threads per 1″.

In practice it is better to use a larger drill if the exact size called for cannot be had.

Size Screw	No. of Threads	Size of Drill			Size Screw	No. of Threads	Size of Drill		
		U. S. S.	" V "	W.			U. S. S.	" V "	W.
1/4	24	.201	.196	.202	15/16	9	.808	.790	.810
1/4	20	.191	.184	.192	1	8	.854	.832	.856
5/16	18	.248	.239	.249	1 1/16	8	.917	.894	.919
3/8	16	.302	.293	.303	1 1/8	7	.957	.932	.960
7/16	14	.354	.345	.355	1 1/4	7	1.082	1.057	1.085
1/2	13	.409	.399	.410	1 3/8	6	1.179	1.144	1.182
1/2	12	.402	.391	.403	1 1/2	6	1.304	1.269	1.307
9/16	12	.465	.453	.466	1 5/8	5 1/2	1.412	1.372	1.416
5/8	11	.518	.506	.520	1 5/8	5	1.390	1.347	1.394
11/16	11	.581	.568	.583	1 3/4	5	1.515	1.472	1.519
3/4	10	.632	.618	.634	1 7/8	5	1.640	1.597	1.644
13/16	10	.695	.680	.697	1 7/8	4 1/2	1.614	1.566	1.619
7/8	9	.745	.728	.747	2	4 1/2	1.739	1.691	1.744

DRILL SIZES FOR S. A. E. THREADS

Size of Tap	Size of Drill
1/4 inch x 28 threads	7/32 inch
5/16 " x 24 "	17/64 "
3/8 " x 24 "	21/64 "
7/16 " x 20 "	3/8 "
1/2 " x 20 "	7/16 "
9/16 " x 18 "	1/2 "
5/8 " x 18 "	9/16 "
11/16 " x 16 "	39/64 "
3/4 " x 16 "	43/64 "
7/8 " x 14 "	25/32 "
1 " x 14 "	29/32 "
1 1/8 " x 12 "	1 1/64 "
1 1/4 " x 12 "	1 9/64 "
1 3/8 " x 12 "	1 17/64 "
1 1/2 " x 12 "	1 25/64 "

The above tap drills allow a thread within 1/64 in. of full thread.

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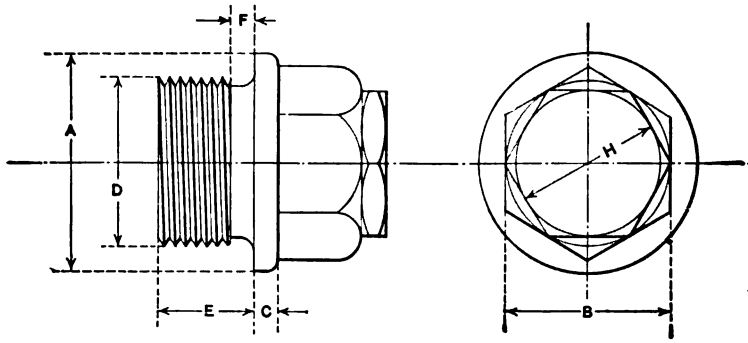
S. A. E. STANDARD SPARK PLUG

The spark plug adopted as a standard has a ⅞-inch diameter, straight thread, 18 pitch, and the design and dimensions shown in the following drawing and specifications:



A—One and one-eighth inch (1⅛").

B—Seven-eighths inch (⅞").

C—One-eighth inch (⅛").

D—Seven-eighths inch (⅞").

E—Not less than one-half inch (min. ½").

F—Not more than one-eighth inch (max. ⅛"). (Depth of recess—not over depth of thread).

H—Three-quarters inch (¾").

SPECIFICATIONS

STOCK—1⅛ inch round.
HEAD FORM—Milled Hex.
SHORT DIAMETER—⅞ inch.
FLANGE FORM—Circular.
DIAMETER—1⅛ inch.
THICKNESS—⅛ inch.
FACE—Annular seat ⅛ inch wide. (Suitable for McKim Type Copper-Asbestos Gasket.)
BLANK FOR THREAD—DIAMETER—⅞ inch.
LENGTH—Not less than ½ inch.
RECESS ADJACENT TO FLANGE—WIDTH—Not over ⅛ inch.
DEPTH—Not over depth of thread.
THREAD DIAMETER—⅞ inch straight.
PITCH—18.
FORM—U. S. Standard.
CUT—Perfect into recess.
Tolerance in third diameter + 0"—.003".
PACKING-GLAND NUT HEAD—FORM—Hexagonal.
SHORT DIAMETER—¾ inch.

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DIMENSIONS OF SQUARE AND HEXAGON BOLT HEADS AND SIZE OF STOCK REQUIRED

UNITED STATES STANDARD SIZES

Diameter	Distance Across Flats, Square and Hexagon	Distance Across Corners, Hexagon	Thickness of Head	Stock for Square Head	Stock for Hexagon Head	Diameter
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1/4	1/2	9/16	1/4	1 9/32	1 3/32	1/4
3/8	11/16	25/32	11/32	1 1/2	1 1/4	3/8
1/2	7/8	1	7/16	1 23/32	1 1/2	1/2
5/8	1 1/16	1 7/32	17/32	2	1 11/16	5/8
3/4	1 1/4	1 7/16	5/8	2 7/32	1 15/16	3/4
7/8	1 7/16	1 21/32	21/32	2 1/2	2 5/32	7/8
1	1 5/8	1 7/8	13/16	2 3/4	2 3/8	1
1 1/8	1 13/16	2 3/32	29/32	3	2 19/32	1 1/8
1 1/4	2	2 5/16	1	3 1/4	2 27/32	1 1/4
1 3/8	2 3/16	2 1/2	1 3/32	3 9/16	3	1 3/8
1 1/2	2 3/8	2 3/4	1 3/16	3 13/16	3 5/16	1 1/2
1 5/8	2 9/16	2 15/16	1 9/32	4 1/16	3 1/2	1 5/8
1 3/4	2 3/4	3 3/16	1 3/8	4 3/8	3 3/4	1 3/4
1 7/8	2 15/16	3 13/32	1 15/32	4 5/8	4	1 7/8
2	3 1/8	3 5/8	1 9/16	4 7/8	4 1/4	2
2 1/4	3 1/2	4 1/16	1 3/4	5 7/16	4 25/32	2 1/4
2 1/2	3 7/8	4 1/2	1 15/16	5 15/16	5 3/16	2 1/2
2 3/4	4 1/4	4 7/8	2 1/8	6 7/16	5 1/2	2 3/4
3	4 5/8	5 11/32	2 5/16	7	6 1/16	3

MANUFACTURERS' STANDARD SIZES

Diameter	Distance Across Flats, Square	Distance Across Flats, Hexagon	Thickness of Head	Stock for Square Head	Stock for Hexagon Head	Diameter
Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
1/4	3/8	7/16	5/16	17/32	23/32	1/4
3/8	9/16	5/8	9/32	13/16	15/16	3/8
1/2	3/4	13/16	3/8	1 1/16	1 3/32	1/2
5/8	15/16	1	15/32	1 11/32	1 13/32	5/8
3/4	1 1/8	1 5/16	9/16	1 5/8	1 9/16	3/4
7/8	1 5/16	1 3/8	21/32	1 7/8	1 7/8	7/8
1	1 1/2	1 9/16	3/4	2 5/32	2 1/32	1
1 1/8	1 11/16	1 3/4	27/32	2 13/32	2 7/32	1 1/8
1 1/4	1 7/8	1 15/16	15/16	2 11/16	2 7/16	1 1/4
1 3/8	2 1/16	2 1/8	1 1/16	3 1/32	2 27/32	1 3/8
1 1/2	2 1/4	2 5/16	1 1/8	3 7/32	3	1 1/2
1 5/8	2 7/16	2 1/2	1 1/4	3 19/32	3 1/4	1 5/8
1 3/4	2 5/8	2 11/16	1 5/16	3 3/4	3 15/32	1 3/4
1 7/8	2 13/16	2 7/8	1 7/16	4 5/32	3 29/32	1 7/8
2	3	3 1/16	1 1/2	4 5/16	4	2
2 1/4	3 3/8	3 7/16	1 3/4	5	4 9/16	2 1/4
2 1/2	3 3/4	3 13/16	1 7/8	5 3/8	4 13/16	2 1/2
2 3/4	4 1/8	4 3/16	2 1/16	5 29/32	5 3/8	2 3/4
3	4 1/2	4 9/16	2 1/4	6 7/32	5 11/16	3

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LASSCO REAR LAMP

This signal automatically notifies the driver behind when the car ahead stops, and by a simple touch of a push button it indicates the intention of the driver to turn to the right or the left.

It combines with this the necessary parts required by law, namely, the maintenance of a permanent red light and the proper illumination of the license number.

The Lassco Rear Lamp is seven inches in diameter. Its warning signals, when illuminated, stand out in red and are clearly discernible for 100 yards or more back of the car carrying them. It is beautiful, durable, simple and always ready—day or night.

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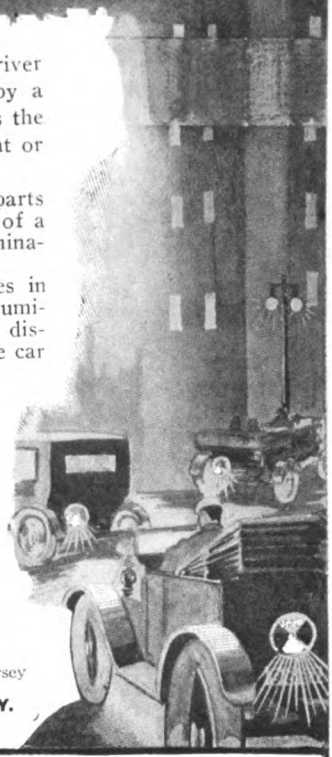

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DIMENSIONS OF STANDARD WEIGHT WROUGHT-IRON PIPE

1¼ and smaller proved to 300 pounds per square inch by hydraulic pressure.
1½ and larger proved to 500 pounds per square inch by hydraulic pressure.

Inside diameter.	Actual Outside Diameter.	Thickness.	Actual Inside Diameter.	Inside Circumference.	Outside Circumference.	Length of Pipe per square foot of inside surface.	Length of Pipe per square foot of outside surface.	Inside Area.	Outside Area.	Length of Pipe containing one cubic foot.	Weight per foot.	No. of Threads per inch of screw.	Taper of threads per inch of screw.
Ins.	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ins.*	*Ft.*	*Ft.*	*Ins.*	*Ins.*	*Ft.*	*Lbs.*		*In.*
⅛	0.405	0.068	0.270	0.848	1.272	14.15	9.44	0.0572	0.129	2500.	0.243	27	1/32
¼	.54	.088	.364	1.144	1.696	10.50	7.075	.1041	.229	1385.	.422	18	1/32
⅜	.675	.091	.494	1.552	2.121	7.67	5.657	.1916	.358	751.5	.561	18	1/32
½	.84	.109	.623	1.957	2.652	6.13	4.502	.3048	.554	472.4	.845	14	1/32
¾	1.05	.113	.824	2.589	3.299	4.635	3.637	.5333	.866	270.	1.126	14	1/32
1	1.315	.134	1.048	3.292	4.134	3.679	2.903	.8627	1.357	166.9	1.670	11½	1/32
1¼	1.66	.140	1.380	4.335	5.215	2.768	2.301	1.496	2.164	96.25	2.258	11½	1/32
1½	1.90	.145	1.611	5.061	5.969	2.371	2.01	2.038	2.835	70.65	2.694	11½	1/32
2	2.375	.154	2.067	6.494	7.461	1.848	1.611	3.355	4.430	42.36	3.600	11½	1/32
2½	2.875	.204	2.468	7.754	9.032	1.547	1.328	4.783	6.491	30.11	5.773	8	1/32
3	3.50	.217	3.067	9.636	10.996	1.245	1.091	7.388	9.621	19.49	7.547	8	1/32

SIZING AND CUTTING OF GEAR WHEELS

The word "diameter," when applied to gears, is always understood to mean the pitch diameter.

Diametral pitch of the gear is the number of teeth to each inch of its pitch diameter.

If a gear has 40 teeth and the pitch diameter is 4 inches there are ten teeth to each inch of the pitch diameter, and the diametral pitch is 10, or in other words the gear is 10 diametral pitch.

Circular pitch is the distance from the center of one tooth to the center of the next tooth, measured along the pitch circle.

If the distance from the center of one tooth to the center of next tooth, measured along the pitch circle, is ½ inch the gear is ½ inch circular pitch.

The diametral pitch given, to obtain the circular pitch divide 3.1416 by the diametral pitch.

If the diametral pitch is 4 divide 3.1416 by 4, and the quotient, .7854 inch, is the circular pitch.

(*Continued on page 672.*)

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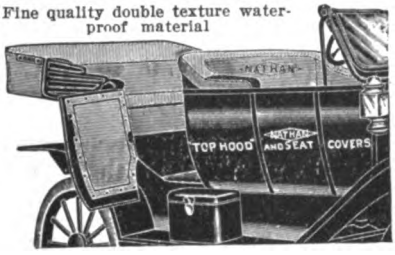

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Here we show a few of our articles. Our Auto and Motor Cycle Catalogues (mailed on request) contain descriptions and prices of many others. Special quotations to Manufacturers, Jobbers and Dealers. Send for them.

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The circular pitch given, to obtain the diametral pitch divide 3.1416 by the circular pitch.

If the circular pitch is 2 inches, divide 3.1416 by 2, and the quotient, 1.5708, is the diametral pitch.

The number of teeth and the diametral pitch given, to obtain the pitch diameter divide the number of teeth by the diametral pitch.

If the number of teeth is 40 and the diametral pitch 4 divide 40 by 4, and the quotient, 10, is the pitch diameter.

The number of teeth and the diametral pitch given, to obtain the whole diameter or size of blank of gear add 2 to the number of teeth and divide by the diametral pitch.

If the number of teeth is 40 and the diametral pitch is 4 add 2 to the 40, making 42, and divide by 4; the quotient, 10½ is the whole diameter of the gear or blank.

The number of teeth and the diameter of the blank given, to obtain the diametral pitch add 2 to the number of teeth and divide by the diameter of the blank.

If the number of teeth is 40, and the diameter of the blank is 10½ inches, add 2 to the number of teeth, making 42, and divide by 10½; the quotient, 4, is the diametral pitch.

The pitch diameter and the diametral pitch given, to obtain the number of teeth multiply the pitch diameter by the diametral pitch.

If the diameter of the pitch circle is 10 inches and the diametral pitch is 4 multiply 10 by 4, and the product, 40, will be the number of teeth in the gear.

The whole diameter of the blank and the diametral pitch given, to obtain the number of teeth in the gear multiply the diameter by the diametral pitch and subtract 2.

If the whole diameter is 10½ and the diametral pitch is 4 multiply 10½ by 4 and the product, 42 less 2, or 40, is the number of teeth.

The thickness of a tooth at the pitch line is found by dividing the circular pitch by 2, or divide 1.57 by the diametral pitch.

If the circular pitch is 1.047 inches, or the diametral pitch is 3, divide 1.047 by 2 or 1.57 by 3, and the quotient, .523 inch, is the thickness of the tooth.

The whole depth of a tooth is found by dividing 2.157 by the diametral pitch.

If the diametral pitch of a gear is 6, the whole depth is 2.157 divided by 6, equals .3595.

The whole depth of a tooth is about 11-16, or exactly .6866 of the circular pitch.

If the circular pitch is 2 the whole depth of tooth is about 11-16 of 2 inches, or 1⅜ inches nearly.

The distance between the centers of two gears is found by adding the number of teeth together and dividing half the sum by the diametral pitch.

If two gears have 50 and 30 teeth, respectively, and are 5 pitch, add 50 and 30, making 80, divide by 2, and then divide the quotient, 40, by the diametral pitch 5, and the result, 8 inches, is the center distance.

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NATIONAL AUTOMOBILE AND ALLIED ORGANIZATIONS

AUTOMOBILE CHAMBER OF COMMERCE, Inc.

7 East 42d St., New York, N. Y.

Objects: To foster the interests of those engaged in the trade or business of manufacturing automobiles and all other self-propelling vehicles.

To reform abuses relative thereto.

To secure freedom of its members from unjust or unlawful exactions.

To diffuse accurate and reliable information as to the standing of merchants and others dealing with members, as to all inventions, patents, processes or devices designed or intended for use in, upon, or in connection with such vehicles and the manufacture thereof, as to the state of the art relative thereto, and as to the condition and development of the trade in which the members are engaged, in the United States and foreign countries.

To procure uniformity and certainty in the customs and usages of such trade.

To promote the construction of better highways.

To advocate the enactment of just and equitable laws affecting members.

To settle differences between members.

To promote a more enlarged and friendly intercourse among business men engaged in such trade or dealing with persons engaged therein.

To acquire by grant, gift, purchase, device or bequest, to hold and to dispose of such property as the purposes of the corporation shall require, subject to such limitations as may be prescribed by law, including inventions, letters patent and processes, or rights thereunder, for the benefit of its members and not for pecuniary profit.

Officers

President, Charles Clifton
Vice-President, Wilfred C. Leland
Secretary, R. D. Chapin
Treasurer, George Pope
Gen. Manager, S. A. Miles

AERO CLUB OF AMERICA

297 Madison Ave., New York, N. Y.

Officers

President, Alan R. Hawley
First Vice-President, Cortlandt Field Bishop
Second Vice-President, Harold F. McCormick
Third Vice-President, Henry A. Wise Wood.
Fourth Vice-President, Charles Jerome Edwards
Treasurer, Arthur Johns
Secretary, Mortimer Delano

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SOCIETY OF AUTOMOBILE ENGINEERS

1790 Broadway, New York, N. Y.

Object: To promote the arts and sciences connected with engineering and mechanical construction o atom obile vehicles.

Officers

President	Howard Marmon
Vice-President	G. J. Perrin
Second Vice-President	Russell Huff
Treasurer	Hermann F. Cuntz
Secretary and General Manager	Coker F. Clarkson

AUTOMOBILE TRADE CREDIT ASSOCIATION

80 Wall St., New York, N. Y.

Object: To protect members against irresponsible debtors; collect and disseminate credit information.

Officers

President, W. O. Turner, Lovell-McConnell Mfg. Co., Newark, N. J.
Vice-President, W. B. Lashar, Weed Chain Tire Grip Co., Bridgeport, Conn.
Secretary and Treasurer, Franz Neilson, 80 Wall St., New York, N. Y.

MOTOR AND ACCESSORY MANUFACTURERS

17 West 42d St., New York, N. Y.

Objects: To promote in all lawful ways the interests of makers of motors, motor parts, and accessories
To aid in the protection of its members.
To secure the advantages to be obtained by mutual co-operation.
To facilitate the collection of the claims of its members and the diffusion of information concerning trade dealers, credits, and other matters of interest to the members of the Association.
To co-operate with similar associations in other states.

Officers

President, J. H. Foster	Treasurer, L. M. Wainwright
First Vice-President, F. H. Lovell, Jr.	Secretary and Asst. Treasurer
Second Vice-President, C. E. Whitney	A. P. Sloan, Jr.
Third Vice-President, F. C. Billings	Manager, W. M. Sweet

THE ELECTRIC VEHICLE ASSOCIATION OF AMERICA

124 West 42d St., New York, N. Y.

Object: The object of this Association shall be to promote the adoption and use of electric vehicles for business and pleasure purposes.

Officers

President, Frank W. Smith, United Electric Light & Power Co., 1170 Broadway, New York, N. Y.
Vice-President, John F. Gilchrist, Commonwealth Edison Co., 120 W. Adams St., Chicago, Ill.
Secretary, Harvey Robinson, New York Edison Company, 124 West 42d St., New York, N. Y.
Assistant Secretary, M. C. Johnson, 124 West 42d St., New York, N. Y.
Treasurer, Day Baker, Geneeral Vehicle Co., 84 State, St., Boston, Mass.

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AMERICAN AUTOMOBILE ASSOCIATION

437 Fifth Ave., New York, N. Y.

Objects: To unite in one body all the automobile clubs and individual motorists of the country to secure reasonable and just legislation.

To aid in proper enforcement of automobile laws and ordinances; to advocate and obtain local, State and Federal aid in the construction and maintenance of good roads.

To encourage touring, and to secure, prepare, and disseminate information relative thereto; and

To support sportsmanlike contests and other movements that will advance motoring interests.

Officers

President, John A. Wilson, Pennsylvania Motor Federation
First Vice-President, H. M. Rowe, Automobile Club of Maryland
Second Vice-President, Ralph W. Smith, Colorado State Automobile Association
Third Vice-President, F. L. Baker, Automobile Club of Southern California
Fourth Vice-President, H. J. Clark, Minnesota State Automobile Association
Fifth Vice-President, Preston Belvin, Virginia State Automobile Association.
Chairman Executive Board, A. G. Batchelder, 437 Fifth Ave., New York, N. Y.
Treasurer, H. A. Bonnell, Associated Automobile Clubs of New Jersey
Secretary, John N. Brooks, Connecticut Automobile Association

Executive Board

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Harry Laurie
Edw. A. Leopold
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W. E. Metzger
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Geo. C. Miller
P. M. Milner
F. C. Pabst
Asa Paine
C. G. Patrick
Henry G. Paulman
Arthur G. Pritchard
Allen S. Ray
J. A. Reynolds
Seth W. Richardson
Dr. H. M. Rowe
P. C. Rubush
John C. Scates
William Schimpf
Hon. E. C. Smith
Ralph W. Smith
Lewis R. Speare
W. M. Sweet
H. D. Train
Theo. Turner
H. L. Vail
Bert Van Tuyle
C. H. Verschoyle
P. J. Walker
Frank G. Webb
Paul C. Wolff

Including Chairmen of Boards

Legislative Board, C. C. Janes, 437 Fifth Ave., New York, N. Y.
Contest Board, William Schimpf, 437 Fifth Ave., New York, N. Y.
Good Roads Board, George C. Diehl, 575 Ellicott Square, Buffalo, N. Y.
Touring Information Board, Howard Longstreth, 437 Fifth Ave., New York, N. Y.

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FEDERATION OF AMERICAN MOTORCYCLISTS

Box 947, Westboro, Mass.

Objects: To encourage the use of motorcycles and to promote the general interests of motorcycling.
To ascertain, defend and protect the rights of motorcyclists.
To facilitate touring.
To assist in the good-roads movement.
To govern and administer the sport of motorcycle racing and other competitions in which motorcycles engage.

Officers

President, Dr. B. J. Patterson, 209 S. Main St., Pratt, Kans.
Secretary-Treasurer, G. B. Gibson, Box 947, Westboro, Mass.
Chairman of Competition Committee, J. L. Donovan, 819 Ashland Blk., Chicago, Ill.
Chairman of Membership Committee, E. M. Estabrook, 76 Lincoln St., Bangor, Me.

NATIONAL ASSOCIATION OF ENGINE AND BOAT MANUFACTURERS (Inc.)

29 West 39th St., New York, N. Y.

Object: To protect, promote, further and advance the interests of the members, as manufacturers and dealers of engines, motors and boats of every kind and description and accessories thereto, and as journalist devoted in all or in part to the interests of engines, motors and boats and allied and kindred industries.

Officers

President, John J. Amory
First Vice-President, Henry R. Sutphen
Second Vice-President, W. H. Mullins
Third Vice-President, C. A. Criqui
Treasurer, James Craig
Secretary, Ira Hand

NATIONAL GAS ENGINE ASSOCIATION

Lakemont, N. Y.

Object: To promote, further and advance the interests of the trade, also to hold a national convention once a year of the interested parties, the purpose of such convention to be for the promoting of education and sociability among the members of the Association.

Officers

President, R. A. Oglesby, South Bend, Ind.
First Vice-President, H. D. Lauson, New Holstein, Wis.
Treasurer, Otto M. Knoblock, South Bend, Ind.
Secretary, H. R. Brate, Lakemont, N. Y.

INTERNAL COMBUSTION ENGINEERS ASSOCIATION

416 W. Indiana St., Chicago, Ill.

Object: Advancement in the broadest sense and in every legitimate manner the interests of Internal Combustion Engineers.

Officers

President, Charles Kratsch
First Vice-President, Henry E. King
Treasurer, I. J. Babcock
Secretary, Wallace V. Pye
Second Vice-President, S. M. Walker
Third Vice-President, J. C. Miller
Fourth Vice-President, Albert Erickson
Fifth Vice-President, C. T. Powell

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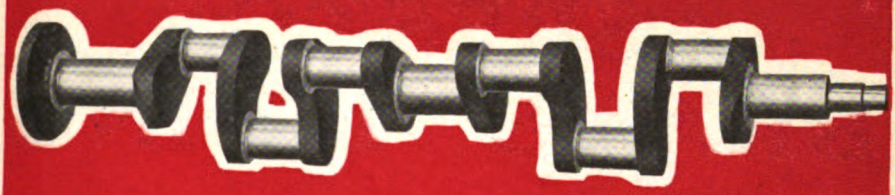

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Won't get Hard. Will never "squeak." Made of Pure Asbestos Threads in which are embedded fine brass wires, the threads being then woven into a solid mass by a patented process, then thoroughly impregnated with a compound that renders the finished article absolutely waterproof, dustproof, grease, oil and mudproof, yet leaves it sufficiently pliable to act quickly at all times.

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	WIDTHS										
Thickness	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2¼ in.	2½ in.	2¾ in.	3 in.	3½ in.	4 in.
1/8	.32	.36	.40	.46	.52	.58	.64	.69	.74	.83	.92
5/32	.36	.42	.48	.56	.64	.72	.80	.87	.94	1.07	1.20
3/16	.42	.50	.58	.68	.76	.84	.94	1.03	1.12	1.28	1.44
1/4	.56	.66	.76	.88	1.00	1.12	1.24	1.35	1.46	1.67	1.88
5/16	.75	.86	.98	1.14	1.28	1.42	1.58	1.72	1.86	2.11	2.36

Asbestos & Rubber Works of New Jersey

Sole Manufacturers

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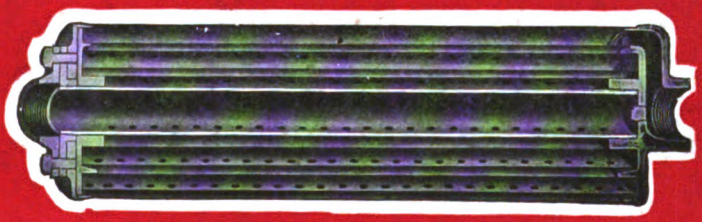

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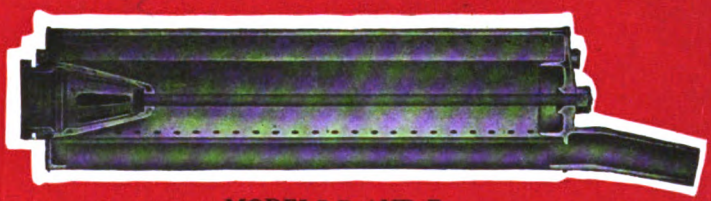
Models A and B are especially adapted for use on Commercial Vehicles and high power engines, either two or four cycle.



MODELS D AND E

Models D and E are used principally on light weight cars.

You cannot afford to waste time and money on high priced transmissions, carbureters, bearings and ignition systems, then lose the results thus gained by using an inefficient muffler.

To get the highest efficiency possible out of your motor, you **must** use an **efficient** muffler.

Let us ship a muffler **on trial** for testing purposes, so that you can verify our claims. Send size of bore and stroke, connection, number of cylinders and cycle.

Write for Illustrated Catalog.

OLDBERG MANUFACTURING CO.

Detroit **Michigan**

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